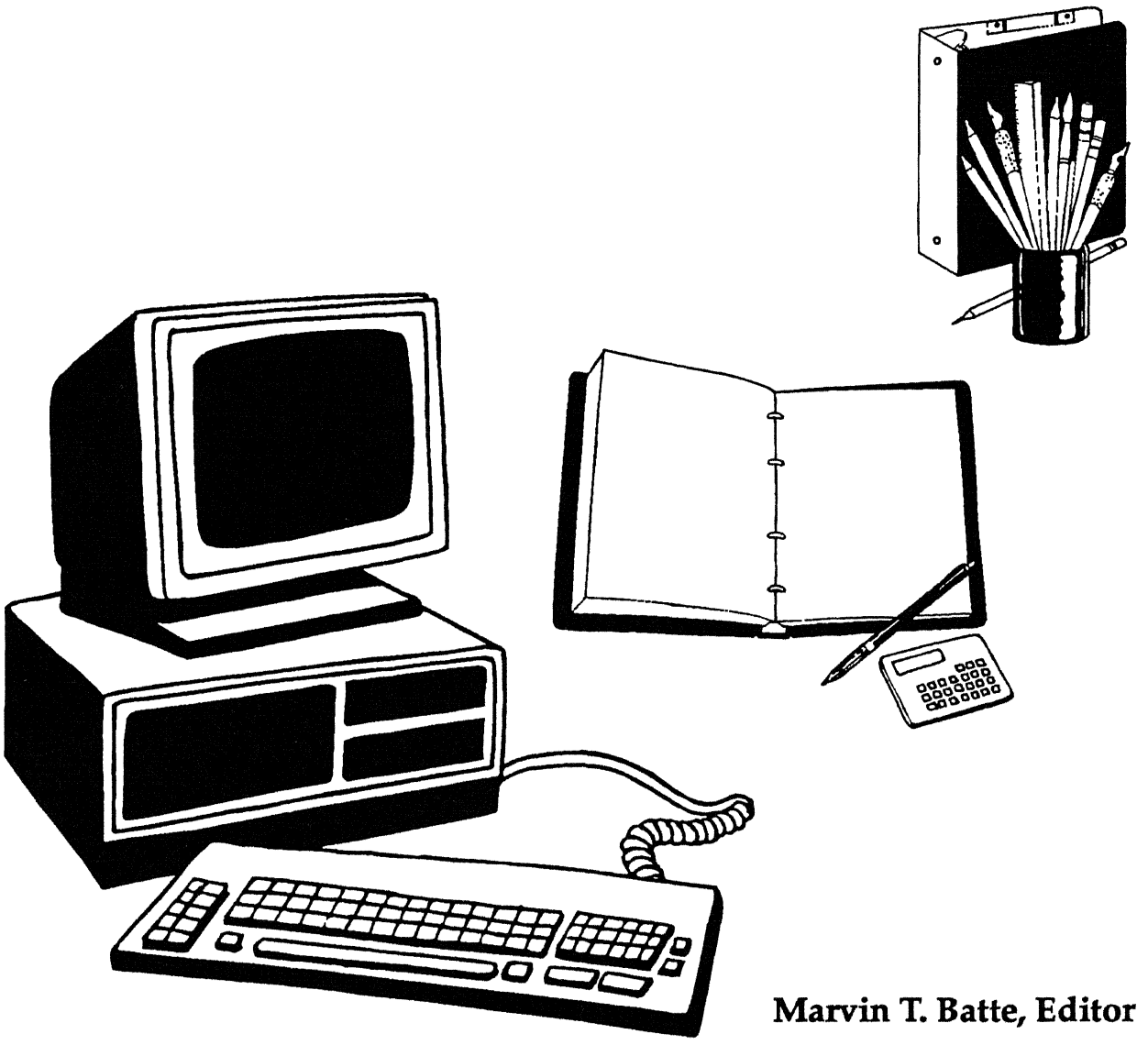
Adoption and Use of Farm Information Systems



Marvin T. Batte, Editor

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Ohio Agricultural Research and Development Center
College of Food, Agricultural, and Environmental Sciences
The Ohio State University

Thomas L. Payne
Director

The Ohio State University
Ohio Agricultural Research and Development Center
Wooster, Ohio

12-95-1M

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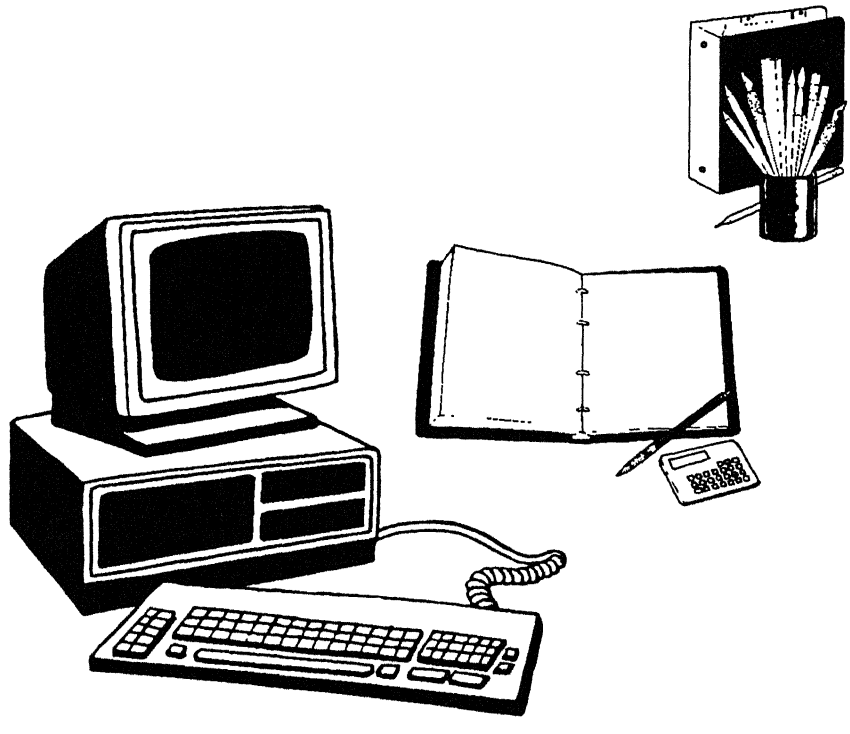

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NC-191: Farm Information Systems

William A. Amponsah, North Carolina A&T State University.
Marvin T. Batte, The Ohio State University.
Tim L. Cross, Oregon State University.
Craig L. Dobbins, Purdue University.
Gary Frank, University of Wisconsin at Madison.
Stephen B. Harsh, Michigan State University.
Robert H. Hornbaker, University of Illinois at Champaign-Urbana.
Robert W. Jolly, Iowa State University.
Robert P. King, University of Minnesota.
M. Edward Rister, Texas A&M University.
Deborah H. Streeter, Cornell University.
Odell L. Walker, Oklahoma State University.
David L. Watt, North Dakota State University.
Marc A. Johnson, Kansas State University, Administrative Advisor.

Preface

In recent decades, the farming industry has changed substantially in many aspects. One such change has been the importance of information in the decision-making process. Increased competitive pressures in farming have resulted in a narrowed profit margin. Many farmers employ high levels of financial leverage. As a result, errors in decisionmaking can be costly.

Farm information technologies also have changed substantially in recent years. Computers are becoming commonplace in farm businesses. Financial and physical recordkeeping continue to be a major focus of computer software developers. Networks of consultants have developed to provide information or decision assistance to farmers.

Regional research project NC-191, *Farm Information Systems*, was developed to study farmers' use of information and the adoption of modern information systems. To facilitate our understanding of farmers' record-keeping methods and the use of this information in decision analysis, the committee surveyed commercial farmers in 13 states, eliciting information on a broad range of information system attributes. This report is a summary of the committee's findings.

List of Contributors

William A. Amponsah is Assistant Professor, Department of Agricultural Economics and Rural Sociology, North Carolina A&T State University.

Marvin T. Batte is Associate Professor, Department of Agricultural Economics, The Ohio State University.

Tim L. Cross was formerly Assistant Professor, Department of Agricultural and Resource Economics, Oregon State University. He now is Associate Professor, Department of Agricultural Economics, Univeristy of Tennessee.

Craig L. Dobbins is Associate Professor, Department of Agricultural Economics, Purdue University.

Gary Frank is Farm Management Specialist, Department of Agricultural Economics, University of Wisconsin at Madison.

Earl Fuller is Professor, Department of Agricultural and Applied Economics, University of Minnesota.

Stephen B. Harsh is Professor, Department of Agricultural Economics, Michigan State University.

Robert H. Hornbaker is Associate Professor, Department of Agricultural Economics, University of Illinois at Champaign-Urbana.

Robert W. Jolly is Professor, Department of Economics, Iowa State University.

Robert P. King is Professor, Department of Agricultural and Applied Economics, University of Minnesota.

List of Contributors -- Continued

Lawrence A. Lippke is Professor, Department of Agricultural Economics, Texas A&M University.

M. Edward Rister is Professor, Department of Agricultural Economics, Texas A&M University.

Gary D. Schnitkey is Associate Professor, Department of Agricultural Economics, The Ohio State University.

Deborah H. Streeter is Associate Professor, Department of Agricultural, Resource and Managerial Economics, Cornell University.

Odell L. Walker is Professor Emeritus, Department of Agricultural Economics, Oklahoma State University.

David L. Watt is Associate Professor, Department of Agricultural Economics, North Dakota State University.

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Chapter 1

Overview and Study Procedures.

Marvin T. Batte

The business of farming has entered a new era -- an age where hard work is perhaps not as key to success as is careful decisionmaking. Competitive pressures within the industry, including international competition, have resulted in a continued narrowing of the profit margin. High levels of financial leverage are commonplace, resulting in heightened financial risks. Moreover, production options have increased significantly as a result of research, technology availability, and environmental concerns. Informed decisionmaking is required to ensure profitable performance of the farm firm and its survival over time. Additionally, government agencies have imposed greater reporting requirements on the farmer. Together, these forces have created an increased need for rigorous systems of information collection and processing to support key managerial decisions.

During the past decade, information collection and processing options available to farmers changed substantially. Developments in computer and telecommunications technologies increased the potential for improved measurement, processing, and timely information dissemination. However, adoption of these technologies has been slower than expected. Various projections made nearly a decade ago forecasted that most commercial farmers would be using computers by 1990. These projections have proven to be overly optimistic even though computer hardware and software capabilities have improved remarkably and prices have declined 50 to 75 percent in nominal terms, and even more in real terms.

Regional research project NC-191, *Farm Information Systems*, was developed to study farmers' use of information and the adoption of modern information systems. The committee had two objectives. The first of these was to "analyze the need for, value of, and factors affecting the adoption of farm information systems". To meet this objective, the committee collected data in two primary ways: A survey of many farmers seeking a general description of farm information system design and use, and personal interviews and focus group discussions designed to answer very specific questions about the decision-making process and farmers' use of records. A brief summary of the findings of the farmer survey is reported in this document.

Survey Procedure

The survey instrument was developed during the first two years of the project, and implemented in March 1991. The target population was commercial farmers in the thirteen NC-191 member states. The thirteen states predominantly represent the Midwestern U.S., but also include Oregon, Texas, Oklahoma, North Carolina, and New York. The survey focused on commercial-sized farms because these farms typically derive most family

income from the farm business. Many small farms in the U.S. provide supplemental income to individuals primarily employed off-farm -- rural residents who may view farming more as a way of life than as a business. Larger farms were expected to have more formal information systems. Due to their larger sales volume, they can derive greater total value from improved information and can spread information system fixed costs over more output units.

Commercial farms were defined arbitrarily to be those with sales greater than $100,000 annually. The National Agricultural Statistics Service (NASS) was contracted to sample from their population list and to process the mailings. Random samples of 750 farmers were drawn from each member state using identical sampling procedures. All farmer identification was removed from the surveys before they were turned over to NC-191. Response rates varied substantially among states, ranging from a low of 20 percent to a high of nearly 46 percent. Total response rate was 30 percent.

The summary statistics that are presented in the following pages depict the group of thirteen states. Statistics have been calculated using a weighting procedure that reflects both the disparate number of commercial farms per state and the differential in survey response by state. Therefore, the statistics reported for the entire sample of farms (Chapters 1 and 2) can be viewed as representative of the thirteen states. Information about the number of commercial farms per state, sample response rates, and weights used in these analyses are reported in Table 1.1. The reader should be cautioned, however, that descriptive statistics for enterprises by size class, presented in Chapters 3 - 7, have <u>not</u> been weighted (due to an unavailability of data necessary for such a weighting) and thus are representative only of the sample.

Descriptive statistics for key sample parameters are presented in Table 1.2. Average gross sales for the sample was slightly more than $200,000. About 73 percent of the sample had sales less than $250,000. Eight percent had sales greater than $500,000 per farm. Average operator age was 49 years, with a standard deviation of nearly 12 years.

Total farm acreage averaged 928 acres. Standard deviation for total farm acreage was quite large, a result of the broad geographical representation of the sample and the diversity of farm types included.[1] Most farm operators (67%) were part-owners of their farmland, 22 percent were full owners, and 11 percent were full tenants. More than 73 percent of the businesses were organized as sole proprietorships, with the bulk of the remainder organized as a partnership. Twenty-one percent of the operators worked at a job away from the farm.

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[1] Average farm size ranged from 425 acres for the Wisconsin sample to more than 2,000 acres in North Dakota, Oregon and Texas.

Table 1.1. Information for weighting the 13-state sample.

States	Number of Farms*	Percent in 13 States@	Sample Responses#	Unweighted Percent of Sample&	Weight Factor+
Illinois.....	19,647	13.0	252	8.7	1.494
Indiana.....	10,953	7.3	211	7.3	0.995
Iowa.....	26,787	17.8	344	11.9	1.492
Michigan.....	6,396	4.2	237	8.2	0.517
Minnesota.....	16,406	10.9	225	7.8	1.397
New York.....	7,299	4.8	243	8.4	0.575
North Carolina.....	8,118	5.4	156	5.4	0.997
North Dakota.....	5,947	3.9	152	5.3	0.750
Ohio.....	8,541	5.7	247	8.6	0.662
Oklahoma.....	5,071	3.4	175	6.1	0.555
Oregon.....	3,845	2.6	229	7.9	0.322
Texas.....	16,377	10.9	169	5.9	1.857
Wisconsin.....	15,357	10.2	248	8.6	1.186
Total.....	150,744	100.0	2,888	100.0	

* Number of commercial farms (gross sales of $100,000 or more), 1987 Census of Agriculture.

@ Percent of commercial farms in the 13 state region that are located in each state.

\# Number of usable responses in each state.

& Percent of the sample responses in each state.

\+ Weight factor is percent in states / unweighted percent of sample. A weight factor greater (less) than 1.0 indicates that a state has less (greater) than proportional representation in the sample.

Table 1.2. Descriptive statistics for selected farm characteristics.

Measure	Mean	Std. Dev.
Average Farm Size (acres)	928	1,568
Average Gross Sales ($)	201,510	225,794
Average Total Investment ($):		
Land and Buildings	404,764	551,731
Machinery	139,107	184,440
Average Operator Age (years)	49.0	11.6
Farms by Sales Class	Percent	
$100,000 - 249,999	72.7	
$250,000 - 499,999	19.3	
Over $500,000	8.0	
Operator by Tenure		
Full Owner	22.0	
Part Owner	67.0	
Full Tenant	11.0	
Farm Organization		
Sole Proprietor	73.1	
Partnership	19.8	
Corporation	7.1	
Operators Working Off-Farm		
None	78.8	
Any	21.2	

NC-191 survey for the 1990 production year.
Responses are weighted so as to be representative of commercial farms in the thirteen state region.

To facilitate comparison of this mixture of farms, farms were classified by their predominant enterprise type (Table 1.3). Farm types were defined to be mutually exclusive. About 38 percent of the farmers in the 13 states were crop farmers producing grain, forage, or fiber crops. Dairy was the next most common farm type, with 23.5 percent of the sample. Hog farms accounted for 15 percent of the sample, and beef farms 10.7 percent.

Presented in Table 1.4 are descriptive statistics for farm and enterprise size measures for the seven farm types. Field crop and specialty crop farms averaged about 800 and 110 acres of field and specialty crops, respectively. Dairy farms averaged about 75 cows milked. Beef cow-calf farms averaged 160 brood cows. Beef stocker/finisher farms averaged about 240 stockers and 270 finishing animals. Hog farrowing farms included farrowing enterprises selling either feeder pigs or hogs finished to market hog weights. Farrowing farms produced an average 305 litters in 1990 and marketed an average 328 feeder pigs and 1,373 market hogs. The hog finishing farm type included only specialized hog finishers (no farrowing activity). These farms sold an average 879 market hogs in 1990.

Table 1.3. Regional distribution of farms by farm type.

Farm Type *	Percent
Grain, forage or fiber crops	37.8
Fruits, vegetables, nursery or specialty crops	5.7
Dairy	23.5
Beef cow-calf	6.5
Beef stocker / finisher	4.2
Hog farrowing	9.3
Hog finishing	5.6
Other livestock	0.6
Mixed livestock	7.0
Total	100.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Farms are classified into a single type most representative of the farm.

Table 1.4. Farm and enterprise size by farm type.

Measure	Farm Type						
	Field crops	Specialty crops	Dairy	Cow-calf	Stocker / finisher	Farrowing	Hog finisher
Total acres	990.77	416.54	418.99	2,520.42	1,498.53	728.87	591.80
Field crop acres	790.84	82.05	287.10	724.51	867.13	592.12	483.76
Specialty crop acres	17.57	109.98	3.93	22.13	23.52	9.27	10.01
Dairy cows	.34	.00	74.63	.03	.00	.10	.24
Beef cows	3.84	2.55	.72	160.37	20.38	3.70	8.29
Beef stockers	2.06	1.49	.93	75.71	239.67	1.87	4.06
Finished beef	2.15	.82	3.13	19.12	268.57	3.85	7.96
Litters farrowed	1.27	.32	.75	1.08	.41	305.00	21.00
Feeder pigs sold	9.71	.78	2.02	5.16	65.60	328.93	18.47
Market hogs sold	7.88	2.87	5.24	3.52	9.96	1,373.11	879.12
Gross sales	178,326.70	226,095.94	175,622.22	173,877.92	310,670.89	257,070.42	180,721.78
Net farm income	29,614.31	35,820.00	25,414.56	27,635.78	53,786.20	33,669.78	22,601.38

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

Comparison of Sample and Census of Agriculture

A comparison of the state sample means to the Census of Agriculture is presented in Table 1.5. Census of Agriculture means are calculated for farms with $100,000 or more of gross sales. Average gross sales generally is smaller for the sample, although the percentage of farmers in the various sales classes generally is comparable between the sample and the Census. Average operator age corresponds closely between the sample and the Census.

Perhaps the largest disparity between the sample and the Census of Agriculture statistics concerns off-farm work by the operator. This difference probably is more a function of differences in the questions asked of survey respondents rather than a lack of representation of the sample.

Table 1.5. Comparison of sample responses to the 1987 Census of Agriculture -- farms larger than $100,000 gross sales.

Measure	Illinois		Indiana		Iowa		Michigan		Minnesota	
	Sample	Census	Sample	Census	Sample	Census	Sample	Census	Sample	Census
Average Farm Size (acres)....	845	791	852	723	627	600	541	667	642	704
Average Gross Sales ($).....	187,681	227,853	243,860	261,350	203,847	239,146	216,453	286,433	198,017	229,998
Farms by Sales Class (%)										
$100,000 - 249,999.....	73.5	76.1	67.6	71.3	73.0	75.4	73.3	67.8	72.5	78.2
$250,000 - 499,999.....	18.6	18.5	22.2	21.1	19.1	18.5	20.0	23.0	20.0	16.6
Over $500,000.....	7.8	5.4	10.2	7.6	7.8	6.1	6.7	9.2	7.5	5.2
Average total Investment ($):										
Land and Buildings.....	485,601	1,035,835	557,454	845,224	372,674	601,946	397,781	655,484	357,535	519,152
Machinery.....	153,165	140,708	175,484	133,159	126,527	107,299	137,642	159,421	140,598	133,309
Average Operator Age (years).	49.3	48.0	49.1	47.4	48.5	46.5	49.9	48.1	47.8	46.0
Operator by tenure (%)										
Full Owner.....	8.9	13.4	14.4	20.0	19.0	20.4	34.5	23.4	24.6	24.7
Part Owner.....	75.1	65.5	73.5	67.9	66.0	60.2	62.0	71.7	67.5	63.9
Full Tenant.....	16.0	21.2	12.2	12.2	15.0	19.5	3.5	4.9	7.9	11.3
Farm Organization (%)										
Sole Proprietor.....	68.8	75.7	58.2	68.6	77.7	76.8	71.4	64.9	81.6	75.7
Partnership.....	22.4	17.2	30.2	17.2	16.8	12.8	23.2	25.2	14.4	17.1
Corporation.....	8.8	6.7	11.6	14.0	5.5	10.2	5.4	9.6	4.0	7.1
Other.....	0.0	0.4	0.0	0.3	0.0	0.3	0.0	0.3	0.0	0.2
Operators working off farm (%)										
None.....	71.0	61.0	74.4	55.9	80.3	67.6	78.2	73.4	84.8	70.2
Any.....	29.0	39.0	25.6	44.1	19.7	32.4	21.8	26.6	15.2	29.8
Farms with Livestock (%)										
Beef.....	19.6	23.3	18.7	20.1	30.3	29.3	6.2	5.6	8.6	10.5
Dairy.....	8.4	9.3	15.7	13.9	10.7	10.8	33.7	40.4	34.3	33.3
Hogs.....	27.6	34.1	29.8	42.7	53.1	63.1	13.5	15.9	30.0	34.0

Continued.

Table 1.5. Comparison of sample responses to the 1987 Census of Agriculture -- farms larger than $100,000 gross sales, continued.

Measure	New York		North Carolina		North Dakota		Ohio		Oklahoma	
	Sample	Census	Sample	Census	Sample	Census	Sample	Census	Sample	Census
Average Farm Size (acres)....	449	513	591	481	2,025	2,324	637	651	1,834	1,997
Average Gross Sales ($).....	194,336	245,304	227,497	347,544	158,039	203,000	191,541	256,518	197,409	361,218
Farms by Sales Class (%)										
$100,000 - 249,999.....	70.1	76.09	46.5	59.8	76.7	81.6	72.8	75.1	74.5	67.7
$250,000 - 499,999.....	26.8	17.29	44.2	26.8	16.7	14.2	16.5	18.2	12.8	23.2
Over $500,000.....	3.1	6.62	9.3	13.3	6.7	4.1	10.7	6.7	12.8	9.2
Average total Investment ($):										
Land and Buildings.....	358,635	489,351	299,614	582,028	370,507	898,754	372,492	799,965	422,729	895,540
Machinery.....	103,842	129,502	97,101	100,197	149,831	175,248	136,790	134,299	120,752	113,079
Average Operator Age (years)	48.8	49.3	48.3	48.6	47.7	45.8	47.4	47.6	53.3	49.7
Operator by tenure (%)										
Full Owner.....	35.1	29.2	19.6	37.6	12.1	11.8	16.9	21.5	15.8	27.3
Part Owner.....	60.6	65.9	67.0	53.3	80.3	77.1	74.2	67.5	72.2	63.0
Full Tenant.....	4.3	4.9	13.4	9.1	7.6	11.1	8.9	11.0	12.0	9.7
Farm Organization (%)										
Sole Proprietor.....	68.0	65.8	64.9	75.4	80.8	80.1	71.8	67.7	75.6	79.0
Partnership.....	24.7	22.6	25.8	15.1	16.8	16.5	21.5	22.0	16.5	12.2
Corporation.....	7.2	11.0	9.3	9.1	2.4	3.0	6.7	9.9	7.9	8.0
Other.....	0.0	0.5	0.0	0.4	0.0	0.4	0.0	0.4	0.0	0.8
Operators working off farm (%)										
None.....	87.1	80.3	78.2	57.9	74.8	72.9	72.6	57.3	79.3	53.5
Any.....	12.9	19.7	21.8	42.1	25.2	27.1	27.4	42.7	20.7	46.5
Farms with Livestock (%)										
Beef.....	5.4	6.5	17.9	22.0	42.8	36.5	10.2	11.4	58.3	49.4
Dairy.....	71.4	76.1	11.3	9.9	12.3	11.2	24.4	30.9	13.7	11.8
Hogs.....	3.0	4.6	9.4	18.3	5.8	8.3	24.4	29.0	2.2	6.5

Continued.

Table 1.5. Comparison of sample responses to the 1987 Census of Agriculture -- farms larger than $100,000 gross sales, continued.

Measure	Oregon		Texas		Wisconsin	
	Sample	Census	Sample	Census	Sample	Census
Average Farm Size (acres)....	2,248	2,686	2,325	3,837	425	460
Average Gross Sales ($).....	238,829	393,458	240,944	518,551	168,828	205,143
Farms by Sales Class (%)						
$100,000 - 249,999.....	70.2	56.8	67.2	63.9	85.3	83.5
$250,000 - 499,999.....	14.9	27.0	19.7	23.0	10.5	12.6
Over $500,000.....	14.9	16.2	13.1	13.1	4.2	4.0
Average total Investment ($):						
Land and Buildings.....	598,177	1,134,896	517,594	1,508,210	275,321	406,611
Machinery.....	95,625	160,955	193,376	127,797	105,664	125,249
Average Operator Age (years).	49.6	50.7	51.6	49.5	48.0	47.1
Operator by tenure (%)						
Full Owner.....	57.4	34.5	28.3	25.9	34.5	28.7
Part Owner.....	36.6	52.6	57.5	51.7	60.0	63.2
Full Tenant.....	5.9	12.9	14.2	22.4	5.5	8.2
Farm Organization (%)						
Sole Proprietor.....	65.0	56.2	75.8	70.8	73.5	70.1
Partnership.....	18.0	19.5	17.2	17.5	18.3	19.0
Corporation.....	17.0	23.8	7.0	10.7	8.2	10.6
Other.....	0.0	0.5	0.0	1.0	0.0	0.3
Operators working off farm (%)						
None.....	84.0	73.0	79.5	56.9	86.5	80.0
Any.....	16.0	27.0	20.5	43.1	13.5	20.0
Farms with Livestock (%)						
Beef.....	24.3	29.8	46.7	39.9	9.1	6.8
Dairy.....	6.8	17.2	5.9	11.6	83.5	82.3
Hogs.....	0.0	3.8	3.7	3.5	14.7	15.5

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Chapter 2

Farm Information Systems Design and Use by Selected Demographic and Business Characteristics.

Marvin T. Batte, M. Edward Rister, Gary Frank, and Gary D. Schnitkey

When one visits with farmers and farm advisors, it becomes clear that recordkeeping is not the farmer's favorite chore. Yet, it is difficult to imagine income tax reporting, loan application, or investment decisionmaking without financial records. The research summarized in this publication documents the diversity of record-keeping methods and the uses farmers make of those records.

This chapter is a summary of the design and use of farm financial and production records. The role of computers in the farm information system is explored. Also, the use of external consultants and electronic information systems is examined. In each case, the influence of farm type and operator and business characteristics is examined.

Financial Records

Financial accounting methods varied substantially among the sampled farmers (Table 2.1). Farmers were asked how financial records were maintained: by farm business personnel or by professionals external to the farm business. Most farmers (88%) maintained some type of financial records system within the business. Just 7 percent of reporting farmers delegated all financial recordkeeping to external professionals. Thirty percent used an external record service in addition to keeping some financial records internally.[2] Five percent maintained no financial records system.

Those farmers who kept financial records internally were asked to identify the person most responsible for this task. Most farmers said recordkeeping was primarily the responsibility of the operator or a business partner (Table 2.1). In about one-third of the farm businesses, a spouse or other family member was responsible for recordkeeping. Less than 2 percent of the farms assigned record-keeping chores to a hired employee.

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[2] It may be that these farmers maintain transaction records internally, but also use accounting professionals to report taxes or provide other services.

Table 2.1. Description of farmers' financial records.

Measure	Percent
Record-keeping method	
Use external records service only	7.0
Keep internal financial records only	57.7
Have both internal and external components	30.3
Keep no financial records	5.0
Total	100.0
Media used for internal farm financial records	
Manual records system	67.9
Computer-based records system	14.7
Both manual and computer-based components	14.8
Mail-in records system	2.6
Total	100.0
Accounting method employed	
Single-entry accounting	69.8
Double-entry accounting	30.2
Total	100.0
Type of computer-based financial records	
General business accounting software	23.3
Accounting package designed for farm firms	48.3
Accounts maintained using an electronic spreadsheet	9.9
Accounts maintained using database management software	4.0
Mail-in records system	11.0
Other	3.5
Total	100.0
Person primarily responsible for keeping financial records	
Operator	61.3
Partner in the farming business	2.8
Spouse or other family member	34.5
Hired employee	1.4
Total	100.0
Hours per month spent keeping and analyzing farm records	
Less than 10 hours/month	74.7
10 - 24 hours/month	20.6
25 - 49 hours/month	3.5
More than 50 hours/month	1.3
Total	100.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

Farmers with internal records were asked a series of questions about characteristics of the farm's records system. Sixty-eight percent of those farmers used a manual record-keeping system (Table 2.1). About 15 percent used a computer-based system and 15 percent used both manual and computer-based systems. Mail-in records systems were used by 2.6 percent of reporting farmers.[3]

Farmers predominantly used single-entry accounting methods (Table 2.1). Those farmers who use a double-entry design were more likely to have post-high school education and to be operators of large businesses. About 54 percent of farmers with computer-based accounting reported use of double-entry accounting techniques.

Farmers who employ computer-based accounting systems were asked the type of system used on their farm (Table 2.1). Most (48.3%) used an accounting package specifically designed for farm businesses. Nearly a quarter of responding farmers used accounting software not specifically designed for farm businesses. Fourteen percent designed their own record-keeping method, employing electronic spreadsheet or database management software.

There were wide ranges in the frequency with which records were updated and in the amount of time used to keep and analyze farm records. Farmers entered financial transactions data an average of 3.7 times per month. This ranged from once annually to daily. Nearly three-quarters of those responding spent less than 10 hours per month keeping and analyzing farm records (Table 2.1). About 5 percent spent more than 25 hours per month with their records. Average time spent keeping and using farm records was 8.2 hours per month.

An improved accounting system can create value in the same way as any other input in the production process: by reducing costs, improving quality, and/or increasing quantity. Evidence from this survey suggests that both computer-based accounting and double-entry systems require more, not less, time. Although there was no statistically significant difference in the number of times data were entered, a comparison of computer-based versus manual systems showed farmers with computer-based accounting systems spent more time with their records than did farmers with manual records (12.6 versus 6.3 hours per month). Farmers with double-entry accounting systems entered data more frequently, averaging 4.7 entry dates per month versus 3.5 for single-entry accounting system users. They also spent more time maintaining and analyzing farm records (11.7 versus 7.0 hours per month) than did their single-entry accounting counterparts.

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[3] Mail-in record systems usually involve manual entry of financial transaction data onto paper entry forms which are mailed periodically to the records processing firm. The farmer receives a computer printed summary and analyses, usually monthly.

There were important differences in financial records design and use by farmers of varying age, education level, farm size and farm type. As operator age increased, the percentage of farms reporting no financial records increased (Table 2.2). The use of computer-based accounting systems decreased with age, as did the use of double-entry accounting techniques. Older farm operators were also less involved in the financial accounting process; a larger proportion of these farmers indicated that the financial records were maintained by the spouse or another family member. Finally, the average time allocated to recordkeeping and analysis diminished with increased operator age.

Table 2.2. Description of farmers' financial records systems by operator age.

Measure	Age of operator					
	Less than 30	30 - 39	40 - 49	50 - 59	60 - 69	70 and over
	Percent					
Record-keeping method:						
Use external records service only	4.1	7.7	6.9	8.1	6.9	2.2
Keep internal financial records only	58.1	56.2	59.9	56.1	57.6	60.7
Have both internal and external components	34.6	33.3	29.3	29.7	28.7	28.4
Keep no financial records	3.1	2.9	3.9	6.1	6.8	8.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Media used for internal farm financial records:						
Manual records system	58.7	57.5	63.1	72.6	81.9	84.2
Computer-based records system	15.2	21.3	19.8	10.2	7.0	3.2
Both manual and computer-based components	21.9	18.7	15.6	14.2	8.0	7.8
Mail-in records system	4.2	2.5	1.5	3.1	3.0	4.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Accounting method employed:						
Single-entry accounting	59.7	62.6	67.5	74.4	77.0	74.3
Double-entry accounting	40.3	37.4	32.5	25.6	23.0	25.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Type of computer-based financial records:						
General business accounting software	14.2	20.8	25.3	19.4	32.5	24.3
Accounting package designed for farm firms	48.7	56.0	47.7	47.9	37.7	28.6
Accounts maintained using an electronic spreadsheet	25.0	10.8	9.4	7.7	7.0	7.1
Accounts maintained using database management software	6.2	2.5	2.6	3.6	1.9	17.7
Mail-in records system	5.8	7.8	9.8	17.4	15.6	22.3
Other	.0	2.1	5.1	4.0	5.2	.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Person primarily responsible for keeping financial records:						
Operator	68.3	66.7	61.0	58.1	59.7	56.9
Partner in the farming business	2.9	3.0	3.4	2.4	1.8	3.0
Spouse or other family member	26.4	28.8	34.4	38.9	36.7	36.0
Hired employee	2.4	1.5	1.3	.6	1.8	4.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Hours per month spent keeping and analyzing farm records:						
Less than 10 hours/month	60.2	70.7	75.3	76.2	80.7	68.3
10 - 24 hours/month	36.7	23.3	20.4	19.9	14.8	26.4
25 - 49 hours/month	.8	4.8	3.2	2.5	3.5	3.2
More than 50 hours/month	2.3	1.2	1.1	1.4	1.0	2.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

Table 2.3 reports characteristics of the farm's financial records for five operator education categories. As the operator's level of formal education increased, the farm was more likely to use a computer-based records system. More highly educated operators were more likely to employ double-entry accounting techniques than those with less formal

education. As years of formal education increased, the operator was more likely to be primarily responsible for the record-keeping function. Finally, as the level of operator education increased, average time devoted to keeping and analyzing the financial records also increased.

Table 2.3. Description of farmers' financial records systems by operator education level.

Measure	Education level of operator				
	Less than high school	High school graduate	Some college education	College graduate	Post B.S. education or degree
	Percent				
Record-keeping method:					
Use external records service only	4.4	6.3	7.9	9.7	4.8
Keep internal financial records only	60.0	59.2	56.5	53.1	60.6
Have both internal and external components	29.0	28.1	32.1	34.5	29.6
Keep no financial records	6.5	6.4	3.4	2.7	5.0
Total	100.0	100.0	100.0	100.0	100.0
Media used for internal farm financial records:					
Manual records system	86.5	77.7	61.5	47.7	54.3
Computer-based records system	3.3	8.7	18.6	28.4	23.4
Both manual and computer-based components	7.0	11.7	16.9	21.2	19.4
Mail-in records system	3.2	1.9	3.0	2.8	2.9
Total	100.0	100.0	100.0	100.0	100.0
Accounting method employed:					
Single-entry accounting	74.3	78.5	64.4	60.4	56.6
Double-entry accounting	25.7	21.5	35.6	39.6	43.4
Total	100.0	100.0	100.0	100.0	100.0
Type of computer-based financial records:					
General business accounting software	31.5	21.4	23.0	23.0	30.0
Accounting package designed for farm firms	35.5	45.4	51.7	53.8	46.0
Accounts maintained using an electronic spreadsheet	12.9	8.4	11.4	7.6	13.7
Accounts maintained using database management software	.0	4.1	2.0	3.8	2.4
Mail-in records system	15.8	14.9	9.2	8.6	7.0
Other	4.3	5.8	2.7	3.2	.9
Total	100.0	100.0	100.0	100.0	100.0
Person primarily responsible for keeping financial records:					
Operator	45.4	56.2	67.6	71.7	70.6
Partner in the farming business	2.1	2.5	2.5	4.6	2.1
Spouse or other family member	51.1	40.6	28.7	21.2	24.4
Hired employee	1.5	.7	1.1	2.6	2.9
Total	100.0	100.0	100.0	100.0	100.0
Hours per month spent keeping and analyzing farm records:					
Less than 10 hours/month	81.8	76.8	72.2	70.3	71.5
10 - 24 hours/month	15.4	19.3	22.0	23.9	25.4
25 - 49 hours/month	1.4	3.0	4.2	4.1	2.4
More than 50 hours/month	1.4	.8	1.7	1.7	.7
Total	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

In Table 2.4, farm size (measured by gross sales) is related to characteristics of farm financial records. As gross sales increased, the farm was increasingly likely to use both internal and external components of financial accounting. Business size was positively related to the use of both computer-based records and double-entry accounting techniques. The operator was less likely to be in charge of maintaining financial records in larger farm

businesses. As farm size increased, the business was more likely to assign accounting chores to a hired employee. Mean hours spent keeping and analyzing financial records increased from about 5 hours per month for the smallest farms to nearly 18 hours per month for the largest farm sales class.

Table 2.4. Description of farmers' financial records systems by gross sales.

Measure	Gross farm sales: Less than $100,000	$100,000 - 249,999	$250,000 - 499,999	More than $500,000
	Percent			
Record-keeping method:				
Use external records service only	6.3	8.4	6.7	6.9
Keep internal financial records only	67.1	56.9	47.3	35.5
Have both internal and external components	21.1	31.0	44.5	56.6
Keep no financial records	5.4	3.7	1.4	1.0
Total	100.0	100.0	100.0	100.0
Media used for internal farm financial records:				
Manual records system	78.8	68.0	47.3	29.1
Computer-based records system	9.0	13.2	28.1	39.4
Both manual and computer-based components	10.6	15.8	19.0	27.4
Mail-in records system	1.7	3.0	5.5	4.1
Total	100.0	100.0	100.0	100.0
Accounting method employed:				
Single-entry accounting	77.4	70.3	62.8	38.4
Double-entry accounting	22.6	29.7	37.2	61.6
Total	100.0	100.0	100.0	100.0
Type of computer-based financial records:				
General business accounting software	26.1	26.8	17.0	22.7
Accounting package designed for farm firms	43.8	42.5	54.9	62.6
Accounts maintained using an electronic spreadsheet	13.1	12.5	7.9	4.9
Accounts maintained using database management software	4.5	1.7	3.4	1.7
Mail-in records system	9.5	13.4	14.0	6.4
Other	2.9	3.2	2.7	1.7
Total	100.0	100.0	100.0	100.0
Person primarily responsible for keeping financial records:				
Operator	64.9	64.5	57.1	52.4
Partner in the farming business	2.0	2.0	4.7	4.5
Spouse or other family member	33.2	33.1	35.9	28.0
Hired employee	.0	.4	2.3	15.0
Total	100.0	100.0	100.0	100.0
Hours per month spent keeping and analyzing farm records:				
Less than 10 hours/month	84.9	74.9	67.8	43.6
10 - 24 hours/month	12.9	21.7	25.8	39.7
25 - 49 hours/month	2.1	2.8	4.2	7.8
More than 50 hours/month	.1	.6	2.2	8.9
Total	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

Financial system characteristics are presented by farm type in Table 2.5. Beef stocker/finisher farms were most likely to have both internal and external records system

components, to use computer-based records, and to employ double-entry accounting techniques. Hog finishers had the highest incidence of manual records and single-entry accounting methods. Dairy farmers were among the most likely to have some form of financial records system, but were least likely to have the records maintained by the operator.

Table 2.5. Description of farmers' financial records systems by farm type.

Measure	Farm Type						
	Field crops	Specialty crops	Dairy	Cow-calf	Stocker / finisher	Farrowing	Hog finisher
	Percent						
Record-keeping method:							
Use external records service only	7.7	3.3	8.8	1.7	11.0	10.5	5.6
Keep internal financial records only	60.9	51.6	53.3	65.3	46.0	57.5	60.4
Have both internal and external components	26.4	34.5	34.9	23.5	36.9	31.4	27.4
Keep no financial records	5.1	10.6	3.0	9.5	6.0	.5	6.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Media used for internal farm financial records:							
Manual records system	67.5	67.5	71.7	69.1	53.8	63.3	72.0
Computer-based records system	15.6	16.4	10.6	9.5	22.0	19.1	13.1
Both manual and computer-based components	15.6	13.6	13.0	20.4	18.1	14.7	15.0
Mail-in records system	1.3	2.5	4.7	1.0	6.1	2.9	.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Accounting method employed:							
Single-entry accounting	72.4	60.6	71.1	69.9	59.3	62.6	73.4
Double-entry accounting	27.6	39.4	28.9	30.1	40.7	37.4	26.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Type of computer-based financial records:							
General business accounting software	26.1	38.2	21.1	36.9	1.8	12.5	20.2
Accounting package designed for farm firms	51.2	26.3	43.0	35.7	64.0	53.2	60.1
Accounts maintained using an electronic spreadsheet	9.3	13.2	12.0	9.7	5.1	6.8	9.3
Accounts maintained using database management software	3.7	4.5	1.5	11.6	5.1	6.0	.0
Mail-in records system	6.2	11.7	20.4	6.1	17.9	15.5	5.2
Other	3.5	6.1	2.1	.0	6.1	6.0	5.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Person primarily responsible for keeping financial records:							
Operator	69.9	56.7	44.5	56.6	65.4	64.0	75.4
Partner in the farming business	1.7	3.9	3.7	2.6	7.7	.5	1.3
Spouse or other family member	27.5	33.7	51.5	39.4	26.9	33.8	23.2
Hired employee	.9	5.7	.4	1.5	.0	1.7	.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Hours per month spent keeping and analyzing farm records:							
Less than 10 hours/month	73.5	65.2	79.1	75.7	69.5	72.1	75.6
10 - 24 hours/month	22.6	25.4	18.0	18.3	27.6	21.2	20.7
25 - 49 hours/month	3.3	5.9	1.8	3.0	1.8	5.4	3.6
More than 50 hours/month	.6	3.5	1.1	3.1	1.1	1.3	.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

Crop records

Farmers were asked to describe the type of system used to maintain crop production records. Most farmers maintained some form of crop production records, although many of these systems were quite informal (Table 2.6). The most common component of the records system was a pocket notebook where entries could be recorded immediately upon observation. Sixty percent maintained a formal, permanent record in addition to these informal records. Most (45.4%) used a manual records system for permanent records.

Fourteen percent used a computer-based crop records system -- about half these systems utilized a software package designed for crop recordkeeping, with the other half using a computer data base of the farmer's own design. These percentages do not add to 100 percent because many farmers employed more than one crop enterprise records system.

Table 2.6. Crop enterprise records systems.

Method or measure	Percent
Crop records system components	
Notes on calendars	34.3
Pocket notebook	67.8
Field records book	45.4
Computerized crop records program	6.8
Computer data base of own design	7.5
Crop information kept in the crop records	
Fertilizer used	85.3
Manure applied	29.3
Herbicides applied	81.9
Insecticides or fungicide applied	62.9
Machinery operations performed	39.1
Yield	75.6
Moisture of crops	34.7
Costs of production and revenue	61.0
Irrigation scheduling/amounts	6.3
Percent keeping records (or charts) of commodity price	
Local cash prices	40.3
Futures market prices	19.1
Forward contract bids	12.8

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

Farmers were asked to indicate the types of information stored in the crop records either on a field-level or crop-level basis. The most common data items included fertilizer rates, herbicide and pesticide applications, crop yields, crop prices, and revenue and cost information (Table 2.6). Some of this information was most commonly maintained in field records (e.g., revenues, costs, and yields) while other information was usually recorded on an enterprise level (fertilization, herbicide, and pesticide treatments).

Table 2.7 reports crop records information by farm type. Specialty crop farms were most likely to use a computer-based crop records system, with about 22 percent so

indicating. It is important to note that livestock farmers also maintained crop production records. The type of information and the record-keeping method differed little from those of the specialized crop producers except for a lesser focus on commodity price (especially futures markets and forward contracts). This is indicative of the fact that many livestock producers reported that a large proportion of their crop production was fed to livestock on the farm.

Table 2.7. Crop enterprise records systems by farm type.

Method or measure	Farm Type						
	Field crops	Specialty crops	Dairy	Cow-calf	Stocker / finisher	Farrowing	Hog finisher
Crop records system components	----------	----------	----------	Percent	----------	----------	----------
Notes on calendars	33.9	37.1	33.9	39.0	37.0	32.3	35.4
Pocket notebook	72.7	50.4	62.3	57.5	67.7	72.9	75.8
Field records book	47.4	50.5	45.0	41.9	46.1	46.1	45.0
Computerized crop records program	8.0	10.5	5.6	6.9	3.2	2.6	6.7
Computer data base of own design	9.6	11.5	3.5	9.0	8.0	5.6	10.0
Crop information kept in the crop records							
Fertilizer used	87.2	83.0	82.8	81.9	94.0	85.1	88.6
Manure applied	10.6	21.9	55.1	15.6	30.3	35.0	36.8
Herbicides applied	84.9	84.4	79.3	66.5	84.3	84.7	88.5
Insecticides or fungicide applied	65.8	81.3	53.8	59.3	72.7	66.0	64.7
Machinery operations performed	41.1	49.3	33.4	38.2	51.4	36.5	38.9
Yield	82.5	70.3	65.4	69.4	82.1	79.7	82.3
Moisture of crops	36.4	27.6	33.6	23.4	34.9	39.3	36.0
Costs of production and revenue	68.6	68.9	45.2	55.0	73.2	65.6	69.9
Irrigation scheduling/amounts	5.3	27.2	2.9	13.1	6.5	3.8	4.7
Percent keeping records (or charts) of commodity price.							
Local cash prices	47.2	41.1	35.8	26.2	35.8	28.9	36.6
Futures market prices	25.8	3.4	8.2	16.1	27.3	17.9	16.5
Forward contract bids	19.7	2.2	5.7	3.4	13.3	11.8	12.2

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

Livestock records

Various attributes of livestock records are reported in Table 2.8. Most livestock producers indicated they maintained production records with a manual system recorded on paper. Ten percent indicated their livestock records were maintained either with a software package designed for this task or in a computer record of their own design. About a quarter of livestock producers said they subscribed to a records service bureau in addition to any records they maintained at the farm. Most service bureau users were dairy farmers -- more than half of all dairy farmers surveyed subscribed to the Dairy Herd Improvement Association (DHIA) records program or a similar service (Table 2.9).

Table 2.8. Livestock enterprise records systems.

Method or measure	Percent
Method used for breeding and dairy production records	
A manual system on paper	84.0
A computer program I designed	5.2
A computer program I purchased	4.9
A service bureau (e.g., DHIA)	24.9
Information recorded for breeding and dairy animals	
Animal health records	45.9
A schedule of when pregnant animals are due	85.5
Sires of pregnant animals	63.2
Number of offspring	66.1
Weights of offspring	18.5
Birthdates of offspring	70.2
Sire and dam of offspring	53.9
Do you keep records of feed fed to animals?	
No	38.2
Yes - on a total farm basis only	35.9
Yes - on a species basis only	6.6
Yes - on a group level within species	12.9
Yes - on an individual animal basis	6.3
Total	100.0
Method used for feeding records	
Paper system	76.7
Self-designed computer system	5.3
Purchased computer feed records	11.6
Other	6.3
Total	100.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

Table 2.9. Livestock enterprise records systems -- by livestock farm type.

Method or measure	Livestock Farm Type				
	Dairy	Cow-calf	Stocker / finisher	Farrowing	Hog finisher
Methods used for breeding and dairy production records			Percent		
A manual system on paper	83.3	85.4	N/A	87.3	N/A
A computer program I designed	4.1	7.2	N/A	2.6	N/A
A computer program I purchased	4.3	2.6	N/A	9.1	N/A
A service bureau (e.g., DHIA)	50.4	1.5	N/A	5.0	N/A
Information recorded for breeding and dairy animals.					
Animal health records	68.4	34.0	N/A	29.7	N/A
A schedule of when pregnant animals are due	94.6	64.8	N/A	93.7	N/A
Sires of pregnant animals	83.7	50.4	N/A	40.5	N/A
Number of offspring	66.0	78.5	N/A	62.7	N/A
Weights of offspring	13.9	30.8	N/A	21.0	N/A
Birthdates of offspring	84.5	58.2	N/A	58.6	N/A
Sire and dam of offspring	79.6	41.8	N/A	24.7	N/A
Method for recording dairy milk production.					
No milk production records	13.9	N/A	N/A	N/A	N/A
DHI production reports	68.9	N/A	N/A	N/A	N/A
A service bureau other than DHI	4.7	N/A	N/A	N/A	N/A
A system I designed	16.4	N/A	N/A	N/A	N/A
Do you keep records of feed fed to animals?					
No	37.0	46.0	27.3	29.3	31.7
Yes - on a total farm basis only	32.1	39.7	52.3	42.2	37.0
Yes - on a species basis only	2.9	5.4	1.3	12.8	10.3
Yes - on a group level within species	12.9	7.0	19.1	15.1	19.8
Yes - on an individual animal basis	15.1	1.9	.0	.7	1.2
Total	100.0	100.0	100.0	100.0	100.0
Method used for feeding records.					
Paper system	69.4	89.6	85.6	80.7	72.4
Self-designed computer system	4.7	2.6	7.3	2.8	12.3
Purchased computer feed records	14.4	.0	5.0	15.4	10.8
Other	11.4	7.8	2.1	1.2	4.5
Total	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

The type of information kept in the livestock production records varies greatly by type of livestock farm (Table 2.9). The dairy record is much more likely to include such animal-specific data as sire and dam of offspring, birthdates and due dates for pregnant animals, and animal health records.

Feed is usually the largest single cost item facing livestock producers. Yet, over a third of all producers did not keep a record of feed fed to animals. Most of those with feed records kept these only on a total-farm basis (Table 2.8). Dairy producers were the only group to keep a substantial percentage (15 percent) of records on an individual animal basis (Table 2.9). Beef and hog finishers frequently kept feed records on a group level basis (e.g., per pen). Most livestock feed records were kept with a manual system recorded on paper. Hog farrowers and dairy producers, at 15.4 and 14.4 percent, respectively, are the most common users of computer-based feed records.

Farmers' Use of Records

Farmers apparently are motivated to maintain records for a variety of reasons. Clearly, state and federal income tax reporting requirements are universal and important motives for maintaining records. However, farmers indicated many other uses of the farm records. Farmers were asked to identify those tasks for which they used their financial records and the relative importance of the records in completing each task (Table 2.10). More than 71 percent of reporting farmers said they used the farm financial records to monitor the firm's cash flow. Two-thirds of the surveyed farmers used financial records to document loan needs or meet other lender requirements. Sixty-one percent used farm records for profitability analyses. Only about 10 percent of the surveyed farmers provided financial records summaries to landlords or other investors in the farm firm.

Table 2.10. Tasks for which the financial records system is used.

Task	Percent Using	Importance Score *
Providing financial records to lenders.....	66.6	4.11
Providing financial records to landlords.....	10.0	3.43
Providing financial information to investors.....	10.2	3.66
Providing reports to govt. regulatory agencies.....	47.3	3.66
Identifying unprofitable parts of the business.....	61.0	4.09
Monitoring cash flows.....	71.3	4.12
Marketing planning and analysis.....	49.2	3.98
Evaluating govt. program options.....	47.0	3.64

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Importance score ranged from 1 (low) to 5 (high).

Farmers were asked to report the importance of their farm financial records for each task listed in Table 2.10. A five-item scale was used to rank these tasks, with one indicating low task importance and five indicating high importance. The most important uses of financial records were monitoring cash flows, providing documentation to lenders, and analysis of firm profitability. These tasks all received an importance score of greater than 4, with "marketing planning and analysis" a close fourth with a score of 3.98. The least important tasks were provision of farm records to landlords, to partners, to other business investors, or to government regulatory agencies.

Farmers were asked to evaluate the importance of their total farm records system (financial, crop, and livestock records) to support decisionmaking (Table 2.11). The most important uses of farm records for crop decisions were in determination of fertilization amount, crop variety, crop species, marketing management, and pest control. However, none of the uses received an importance score of greater than 4.

Table 2.11. Importance of farm records system for making farm decisions.

Decision	Score *
Crop decisions	
Fertilization amount	3.80
Pesticide amount and timing	3.48
Crop variety	3.76
Tillage system	3.17
What crops to plant by field	3.61
Evaluating crop insurance	2.42
How and when to market	3.15
Evaluating govt. programs	3.00
Determining land rental rates	2.76
Irrigation scheduling	1.83
Livestock decisions	
Most economical feed ration	3.64
Health program/disease prevention	3.79
What animals to cull	3.86
What sires to use	3.61
When to breed animals	3.74
Producing vs. purchasing feed/hay	2.92
Grazing intensity - stocking rate	2.18
When to expand/contract herd size	2.52
When to market animals/products	3.00
How/where to market animals/products	2.96
Investment decisions	
When to trade equipment	2.99
When to build/expand buildings	2.70
Evaluating lease/purchase of land	2.91
Evaluating lease/purchase of machinery	2.87
Borrowing money	3.60
Tax planning	4.08
Evaluating profitability of the farm	4.18
Home vs. business use of finances	3.12

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Importance score ranged from 1 (low) to 5 (high).

These rankings were fairly consistent across the various farm types (Table 2.12). Specialty crop producers exhibited the greatest difference in rankings from the others, with pest control decisions receiving the highest importance score and being the only one above 4 in the crop decisions section.

Livestock decisions aided most by records data include livestock culling, health, breeding, and ration selection decisions (Table 2.11). Again, there were no overall importance scores of above 4. There was greater diversity in decision importance for livestock decisions than for crop production decisions (Table 2.12). Dairy producers gave culling, breeding, sire selection, herd health, and feeding decisions importance scores greater than 4. These were the only importance scores greater than 4 in the livestock decisions section.

Hog farrowing farmers cited culling, breeding, and feeding decisions as most important. Beef cow-calf producers were concerned about health and breeding, but how and where to market animals also were highly important. Beef stocker/finishers and hog finishers gave highest rankings to health, feeding, and marketing decisions.

Financial and investment decisions best supported by the farm records included profitability evaluation and tax planning with importance scores greater than 4 (Table 2.11). Debt financing, home and business financial concerns, and equipment replacement had importance scores of 3.6, 3.12, and 2.99, respectively. These decisions consistently were ranked highly across all farm types (Table 2.12). However, only profitability and tax planning registered importance scores above 4. Land control decisions also were important for several farm types.

Table 2.12. Importance of farm records system for making farm decisions -- by livestock farm type. *

	Farm Type						
Decision	Field crops	Specialty crops	Dairy	Cow-calf	Stocker / finisher	Farrowing	Hog finisher
Crop decisions							
Fertilization amount	3.91	3.93	3.68	3.47	3.64	3.77	3.92
Pesticide amount and timing	3.51	4.18	3.45	3.17	3.23	3.41	3.40
Crop variety	3.80	3.80	3.66	3.45	3.91	3.76	3.96
Tillage system	3.33	2.85	3.11	2.93	3.22	2.94	3.10
What crops to plant by field	3.72	3.33	3.66	3.45	3.23	3.38	3.54
Evaluating crop insurance	2.64	2.44	2.02	2.31	2.64	2.24	2.32
How and when to market	3.65	2.86	2.20	3.19	3.28	3.00	3.29
Evaluating govt. programs	3.44	2.26	2.47	3.06	3.22	2.85	2.79
Determining land rental rates	3.05	2.54	2.31	2.72	2.70	2.87	2.90
Irrigation scheduling	1.94	2.87	1.29	2.46	2.31	1.51	1.75
Livestock decisions							
Most economical feed ration	.	.	4.08	3.10	3.50	3.57	3.38
Health program/disease prevention	.	.	4.14	3.50	3.52	3.81	3.39
What animals to cull	.	.	4.36	4.00	2.72	3.88	3.11
What sires to use	.	.	4.09	3.75	2.24	3.49	2.92
When to breed animals	.	.	4.31	3.49	2.03	3.89	3.04
Producing vs. purchasing feed/hay	.	.	3.12	3.11	3.24	2.53	2.73
Grazing intensity - stocking rate	.	.	1.93	3.15	2.69	1.86	1.96
When to expand/contract herd size	.	.	2.32	2.91	2.67	2.43	2.64
When to market animals/products	.	.	2.57	3.27	3.53	2.93	3.27
How/where to market animals/products	.	.	2.56	3.29	3.38	2.98	3.16
Investment decisions							
When to trade equipment	3.17	3.12	2.94	2.76	2.89	2.80	2.77
When to build/expand buildings	2.54	2.87	2.76	2.46	2.73	3.02	2.83
Evaluating lease/purchase of land	3.17	2.76	2.42	2.99	3.03	3.07	2.98
Evaluating lease/purchase of machinery	3.17	2.79	2.57	2.62	2.83	2.88	2.74
Borrowing money	3.73	3.68	3.50	3.37	3.62	3.56	3.44
Tax planning	4.16	4.13	3.95	4.07	3.99	4.08	4.10
Evaluating profitability of the farm	4.23	4.30	4.13	4.08	4.17	4.21	4.06
Home vs. business use of finances	3.12	3.22	3.16	2.84	3.19	3.21	2.96

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Importance score ranged from 1 (low) to 5 (high).

A comparison of Table 2.6 and Table 2.11 (the "Crop Decisions" section) shows the types of crop records farmers kept were consistent with the uses farmers said they made of those records in decisionmaking. Table 2.8 can be compared to Table 2.11 (the "Livestock Decisions" section). The highest rated decision for livestock producers requires a combination of much of the information farmers said they collected for the livestock enterprise. There is a strong correspondence between the data collected by livestock farmers and the decisions they made using that data.

In addition, Table 2.11 (the "Investment Decisions" section) can be compared to Table 2.10. The fit for financial records is not nearly as close as for the crop and livestock records. Perhaps farmers have a more concise idea of the relationship between the records they should keep and the decisions to be made in the areas of crop and livestock production than they do in the area of finance.

Farm Computer Adoption and Use

About 1980, with the arrival of the microcomputer, there was widespread expectation that farmers would quickly and broadly adopt computers as a tool of management. Today, more than a decade after the introduction of the microcomputer, the farm computer is far from a universal tool.

Computer adoption for this sample of commercial farmers averaged 26.7 percent (Table 2.13). Computer adoption varied significantly among states, ranging from 14.4 percent of North Carolina farmers to a high of 40 percent of Oregon farmers. Computer adoption varied significantly with farm operator and business characteristics. Younger and more highly educated farmers were significantly more likely to adopt computers than were their older or less educated counterparts. Farmers younger than the mean age were twice as likely to have adopted a computer than were farmers older than the mean age. Farmers with post-high school education were about 2.6 times more likely to use a computer than were their counterparts with less formal education.

Three survey questions give insight into the usefulness of the farm computer (Table 2.13). Farmers were asked directly to evaluate the computer's usefulness for management decisionmaking. A five-item scale was used to evaluate usefulness, with a score of one indicating low usefulness and five indicating high usefulness. Computer usefulness typically was valued highly, with a mean evaluation of 4.0. Only 8.3 percent of all computer adopters gave a usefulness evaluation below three, the midpoint of the scale. Although most computer users gave positive evaluations, significant differences existed: Computer evaluation scores were positively associated with firm sales and education level and negatively associated with operator age.

Table 2.13. Percentage of farmers adopting computers and their evaluation of its usefulness for management.

Measure	Computer adoption percent	Computer usefulness score *	Hours of computer use per month @	Months before computer is useful #
Full sample	26.7	4.0	15.6	7.5
State				
Illinois	29.9	4.0	13.5	7.3
Indiana	29.4	3.8	14.7	5.8
Iowa	22.2	3.8	13.4	9.7
Michigan	32.2	4.1	15.8	7.0
Minnesota	29.5	4.1	14.0	7.7
New York	27.4	4.1	15.6	5.0
North Carolina	14.4	3.7	14.8	18.1
North Dakota	29.0	4.3	11.2	6.7
Ohio	32.1	3.8	14.6	7.4
Oklahoma	17.4	4.2	7.7	6.5
Oregon	40.2	4.1	32.3	5.1
Texas	30.0	4.2	22.7	5.8
Wisconsin	22.3	4.1	10.7	8.2
Age of operator				
Less than 30	41.4	4.2	16.0	7.0
30 - 39	36.3	4.2	15.3	6.6
40 - 49	33.6	4.1	17.1	8.4
50 - 59	20.5	4.0	14.0	7.3
60 - 69	15.0	3.5	15.4	7.2
70 and over	4.8	4.3	17.8	10.0
Education level of operator				
Less than high school	10.3	3.6	16.0	6.5
High school graduate	16.7	4.0	12.5	7.0
Some college education	32.6	4.0	17.9	8.5
College graduate	48.1	4.2	17.2	7.1
Post B.S. education or degree	42.5	4.0	13.8	7.1
Gross farm sales				
Less than $100,000	18.2	3.9	11.3	6.4
$100,000 - 249,999	26.3	3.9	12.4	7.5
$250,000 - 499,999	46.8	4.3	13.5	8.0
More than $500,000	67.9	4.3	33.7	6.8
Farm Type				
Field crops	27.1	4.0	12.7	7.0
Specialty crops	28.9	4.2	40.6	6.6
Dairy	23.9	4.0	11.9	7.4
Cow-calf	27.3	3.7	15.6	5.4
Stocker / finisher	33.3	4.3	22.4	6.2
Farrowing	33.2	4.2	13.4	6.1
Hog finisher	20.0	4.1	12.5	11.7

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Hours of use of computer for farm management tasks.
\# Months from computer purchase until the computer was felt to be useful as a management tool.

The second measure of computer usefulness is the number of hours the computer is used (Table 2.13). On average, producers reported 15.6 hours computer use per month. There were no meaningful differences in computer use for farmers of differing age, education level, or gross sales.

Farmers also were asked to indicate the number of months that had elapsed between the acquisition of the computer system and the point at which the computer became "useful" (Table 2.13). The range was substantial, extending from zero months to six years.[4] The average was 7.5 months. This means that over 115 hours of hands-on computer use were required by the average user before they felt comfortable about the "usefulness of a computer." This is a long learning curve and may explain why adoption rates are so low among farmers.

There were no important differences in the months until useful measure among farmers by age, education, or sales level. Lack of system acceptance may be attributable in large part to inadequate training -- about 56 percent of the surveyed farmers indicated they had received no formal training in the use of computers.

Various characteristics of the farm computer systems are presented in Table 2.14. Nearly three-quarters of the computer systems on farms were IBM compatible microcomputers. Older Apple II compatible microcomputers were still used on about 9 percent of the surveyed farms. Apple MacIntosh computers were used on only about 3 percent of the surveyed farms.

The rate of adoption of computers increased starting about 1987, the approximate end of the period of financial stress in farming (Table 2.14). About two-thirds of the computers on the surveyed farms were acquired since the beginning of 1987.

The primary user of the farm computer is the farm operator or a partner (Table 2.14). Spouses operated the computer on 31 percent of the farms. In 3.5 percent of the cases, a hired farm employee was the primary computer operator. Hired employees most frequently operated the computer on farms with large gross sales.

The surveyed farmers were asked a series of questions about the hardware configuration of their computer systems. Seventy-eight percent had hard disk systems, 28 percent had a modem for telephone connection to remote computer systems, 30 percent had a math coprocessor chip, and virtually all owned a printer. Most computers were equipped with 64 to 640 Kilobytes of random access memory (RAM).

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[4] The largest time periods were reported by farmers who had not found the computer to be useful to date -- from computer purchase to the date of the survey.

Table 2.14. Description of the farm computer system.

Measure	Percent
Type of computer system	
Microcomputer - IBM or compatible	73.5
Microcomputer - Apple II or compatible	8.9
Microcomputer - Apple MacIntosh	3.1
Microcomputer - Other	5.2
Mini- or Mainframe-computer	.8
Time-share computer service	.9
Mail-in computer service	7.5
Total	100.0
Year of computer purchase	
Prior to 1983	5.6
1983	4.7
1984	6.0
1985	8.1
1986	8.2
1987	13.5
1988	13.3
1989	18.6
1990	18.0
First quarter 1991	4.0
Total	100.0
Primary operator of the computer	
Operator	55.3
Partner in the business	4.2
Spouse	31.1
Other family member	5.8
Farm employee	3.5
Total	100.0
Does your computer have a hard (fixed) disk drive?	
No	19.1
Yes	78.0
Do not know	2.9
Total	100.0
Does your computer have a modem?	
No	63.2
Yes	28.4
Do not know	8.3
Total	100.0

Continued.

Table 2.14. Description of the farm computer system -- continued.

Measure	Percent
Does your computer have a math coprocessor?	
No	45.6
Yes	30.2
Do not know	24.2
Total	100.0
Do you have a printer?	
No	1.6
Yes	95.2
Do not know	3.2
Total	100.0
How much random access memory (RAM) does your computer have?	
Do not know	26.2
Less than 64K	6.0
64K - 640K	56.7
1 Meg	7.2
2 Meg	2.8
4 Meg or more	1.1
Total	100.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

The variety of applications made of the computer and the type of software used likely influence farmers' perceptions of computer usefulness. Farmers were asked to identify from a list of management tasks those for which they used the computer and to evaluate the usefulness of the computer in completing each task (Table 2.15). The most frequently used application type was financial accounting. More than 86 percent of computer adopters used the computer for financial accounting. An additional 72 and 66 percent used their computer for business planning and tax computation, respectively. Fifty-two percent of the respondents used their computers for crop recordkeeping, and 30 percent of all respondents (48 percent of livestock farms) used it for livestock recordkeeping. Computer tasks given the highest helpfulness evaluations were financial accounting, tax computation, livestock enterprise recordkeeping, and business planning. The usefulness evaluations were largely the same for the various farm types although the percentages using various tasks varied by farm type (Table 2.16).

Table 2.15. Management tasks for which the computer is used and its helpfulness rating.

Task	Percent Using	Helpfulness Score *
Business financial accounting	86.2	4.54
Business planning	72.2	4.23
Tax computation	66.0	4.40
Business correspondence	53.0	3.79
Herd production recordkeeping	29.9	4.24
Crop production recordkeeping	52.4	3.95
Marketing and price analysis	26.4	3.75
Access to an electronic information service	15.7	3.62

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Helpfulness score ranged from 1 (low) to 5 (high).

Table 2.16. Management tasks for which the computer is used and its helpfulness rating -- by farm type.

Task	Farm Type						
	Field crops	Specialty crops	Dairy	Cow-calf	Stocker / finisher	Farrowing	Hog finisher
	Percent using						
Business financial accounting	88.6	77.6	78.3	89.7	97.4	85.4	89.6
Business planning	76.9	67.8	59.6	75.5	78.8	75.1	84.5
Tax computation	67.5	59.9	56.0	81.4	65.3	68.4	72.2
Business correspondence	56.3	65.6	40.2	66.3	73.6	50.4	46.4
Herd production recordkeeping	8.2	16.7	52.9	45.5	36.2	45.7	43.6
Crop production recordkeeping	63.0	50.6	30.7	56.6	53.6	45.7	75.5
Marketing and price analysis	33.5	21.2	7.0	39.7	42.8	21.2	48.2
Access to an electronic information service	17.0	5.9	6.2	33.2	8.0	19.2	24.8
	Usefulness score *						
Business financial accounting	4.4	4.7	4.5	4.6	4.8	4.7	4.4
Business planning	4.2	4.1	4.2	4.2	4.6	4.5	4.2
Tax computation	4.4	4.4	4.5	4.1	4.5	4.4	4.5
Business correspondence	3.7	3.8	3.8	3.9	3.7	3.7	4.0
Herd production recordkeeping	4.0	4.5	4.2	4.4	3.6	4.4	4.2
Crop production recordkeeping	4.0	4.4	3.9	4.1	3.8	3.6	3.9
Marketing and price analysis	3.8	3.8	2.8	3.5	3.9	4.1	3.4
Access to an electronic information service	3.6	4.2	3.6	3.3	3.9	3.8	4.7

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Usefulness score ranged from 1 (low) to 5 (high).

The other part of the equation is the type of software used by the manager. Farmers were asked to indicate the percentage of time the computer was used with each of several application software types (Table 2.17). For the typical farm, business financial accounting software occupied the computer the greatest proportion of the time, averaging 47.6 percent of usage time. This was followed, in decreasing proportion of time used, by electronic spreadsheet (16.3%) and word processing software (11.6%). These usage percentages were fairly consistent across the various farm types except for differences in time allocated for use of crop and livestock records software (Table 2.18).

Table 2.17. Percentage of time that the farm computer is used for various computer software applications.

Software application	Percent
Business accounting software package	47.6
Tax computation package	4.5
Electronic spreadsheet software	16.3
Word processing software	11.6
Data base management software	3.4
Market price analysis software package	1.5
Crop recordkeeping software	4.9
Livestock recordkeeping software	5.1
Other	5.0

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

Table 2.18. Percentage of time that the farm computer is used for various computer software applications -- by farm type.

	Farm Type						
Software application	Field crops	Specialty crops	Dairy	Cow-calf	Stocker / finisher	Farrowing	Hog finisher
Business accounting software package	45.7	40.1	47.4	42.4	49.6	54.1	43.6
Tax computation package	4.4	3.1	4.2	7.3	4.5	3.4	10.6
Electronic spreadsheet software	18.1	20.1	13.3	17.7	9.3	13.2	23.9
Word processing software	13.4	12.2	12.1	10.0	11.9	8.5	6.7
Data base management software	3.2	7.9	1.7	5.8	5.3	1.4	3.8
Market price analysis software package	1.9	2.6	.1	1.7	2.2	2.9	.4
Crop recordkeeping software	7.4	4.2	3.5	4.5	3.9	4.0	1.6
Livestock recordkeeping software	.7	.0	11.3	4.2	4.8	11.8	3.0
Other	5.0	9.8	6.3	6.3	8.6	.7	6.5

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.

A relatively new and evolving information source is the remote electronic information service. Some of these require computers to access (e.g., COMPUSERVE, The Source, etc.) while others may require only special receiving equipment provided with the information service subscription (e.g., Data Transmission Network (DTN), etc.). For the thirteen-state sample, just over 12 percent of farm computer users (or 3 percent of all farmers in the sample) indicated subscription to at least one electronic information service (Table 2.19). This varied substantially across states, ranging from a low of less than 1 percent in North Carolina and Oregon to a high of more than 28 percent in Iowa. Adoption of these services was a decreasing function of age, and an increasing function of both operator education level and gross sales. There were also substantial differences in adoption percentages for the various farm types: Field crop, beef finisher, and hog farms reported the highest adoption levels.

Table 2.19. Farmers' use of computerized information networks.

	CIS adoption percent	CIS usefulness score *	Annual expenditure @
Full sample	12.18	4.21	$288.36
State			
Illinois	23.32	4.27	216.37
Indiana	28.43	4.22	305.47
Iowa	11.51	4.23	285.05
Michigan	7.30	4.54	397.69
Minnesota	14.15	4.22	252.68
New York	3.98	3.87	770.50
North Carolina	.94	#	#
North Dakota	5.80	3.69	234.63
Ohio	14.03	4.21	235.60
Oklahoma	2.88	4.75	108.75
Oregon	.97	#	#
Texas	6.02	3.59	251.00
Wisconsin	6.49	4.57	537.67
Age of operator			
Less than 30	17.62	4.14	300.99
30 - 39	17.79	4.24	304.84
40 - 49	16.86	4.09	279.69
50 - 59	10.33	4.33	280.97
60 - 69	4.92	4.42	282.74
70 and over	.00	#	#
Education level of operator			
Less than high school	2.87	4.55	256.39
High school graduate	9.76	4.12	285.98
Some college education	15.75	4.23	265.71
College graduate	19.54	4.31	332.18
Post B.S. education or degree	15.17	4.09	248.70
Gross farm sales			
Less than $100,000	8.44	4.04	210.19
$100,000 - 249,999	12.19	4.20	354.89
$250,000 - 499,999	22.33	4.40	338.18
More than $500,000	33.81	4.32	280.19
Farm Type			
Field crops	16.52	4.13	271.49
Specialty crops	2.48	3.94	249.20
Dairy	4.42	4.46	647.13
Cow-calf	4.68	3.29	61.34
Stocker / finisher	13.37	4.26	223.13
Farrowing	24.18	4.25	207.84
Hog finisher	17.59	4.51	258.07

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Total expenditure for all CIS sources
\# Too few observations in this cell to be meaningful.

Those farmers who used at least one electronic information service were asked to evaluate the usefulness of these systems for management decision support. Farmers uniformly gave high evaluation, averaging 4.21 on a five-item usefulness scale (Table 2.19). Annual expenditure for information service subscriptions averaged $288. Annual expenditure varied substantially across state and farm type.

Finally, farmers continue to supplement their on-farm information systems with information gained from outside advisors. Presented in Table 2.20 is a list of professionals who have traditionally been important providers of information to farmers, the percent of the sample who reported use of each source during the past two years, and the usefulness evaluations given to each source. Tax preparers were the most commonly used consultant, with more than 80 percent reporting use of such a service. This was followed (in decreasing order of use) by county Cooperative Extension agents, veterinary consultants, accountants or financial advisors, and crop management consultants. The least used services were computer hardware and software vendors/advisors. The highest usefulness scores were given to tax preparers, veterinary consultants, financial advisors, farm records association agents, and crop management consultants. The lowest usefulness scores were given to computer hardware and software vendors.

Table 2.20. Professional services used during the past two years as a source of information and usefulness ratings.

Measure	Percent Using	Usefulness Score *
Accountant or financial advisor	46.3	4.18
Farm records association agent	13.4	4.12
Tax preparer	82.3	4.37
Livestock management advisor	11.3	4.01
Crop/pest management consultant	36.7	4.04
Computer software vendor/advisor	8.1	3.54
Computer hardware vendor/advisor	5.9	3.48
Farm management consultant	10.6	3.88
Coop. Extension - county agent	51.1	3.65
Coop. Extension - specialist	27.6	3.82
University professor	11.3	3.74
Vocational agriculture teacher	8.4	3.63
Veterinary consultant	49.4	4.23

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Usefulness score ranged from 1 (low) to 5 (high).

The usage percentages and usefulness scores for the external information providers are presented by farm type in Table 2.21. As expected, the percentage using the various information sources varied substantially by farm type. However, the usefulness evaluations were uniformly high for nearly all sources, with rankings consistently near the top for tax preparers and financial advisors.

Table 2.21. Professional services used during the past two years as a source of information and usefulness ratings -- by farm type.

Source	Farm Type						
	Field crops	Specialty crops	Dairy	Cow-calf	Stocker / finisher	Farrowing	Hog finisher
	Percent using						
Accountant or financial advisor	44.4	55.3	47.5	47.1	50.1	48.6	44.1
Farm records association agent	12.7	6.5	16.7	5.3	15.1	18.3	12.2
Tax preparer	82.0	69.8	82.8	80.0	77.8	84.8	86.8
Livestock management advisor	2.2	2.3	24.4	6.7	11.2	16.6	10.7
Crop/pest management consultant	39.4	34.4	40.6	24.0	32.9	34.6	30.1
Computer software vendor/advisor	9.3	6.7	5.7	9.3	8.4	9.3	9.3
Computer hardware vendor/advisor	7.6	5.2	3.4	11.0	3.5	4.1	4.3
Farm management consultant	10.4	10.7	14.0	1.7	8.2	8.9	16.0
Coop. Extension - county agent	52.5	61.1	51.4	54.6	50.7	47.4	50.9
Coop. Extension - specialist	28.0	42.8	25.9	26.6	31.1	24.3	23.7
University professor	11.4	23.0	11.0	13.4	9.5	11.2	7.6
Vocational agriculture teacher	6.5	2.2	12.3	11.9	5.7	5.5	10.5
Veterinary consultant	18.1	11.0	77.6	66.0	78.0	74.2	73.8
	Usefulness score *						
Accountant or financial advisor	4.14	4.34	4.19	4.14	4.38	4.36	4.06
Farm records association agent	4.25	4.34	4.05	4.08	4.34	4.07	3.48
Tax preparer	4.35	4.43	4.36	4.30	4.50	4.40	4.36
Livestock management advisor	3.85	2.78	4.13	4.27	4.33	4.18	3.16
Crop/pest management consultant	4.13	4.14	3.98	4.15	4.26	4.17	3.59
Computer software vendor/advisor	3.40	3.59	3.62	3.58	4.30	3.82	3.16
Computer hardware vendor/advisor	3.15	3.73	3.65	3.97	5.00	3.63	4.42
Farm management consultant	4.08	3.21	3.96	3.37	3.61	3.83	3.33
Coop. Extension - county agent	3.68	4.10	3.53	3.74	3.59	3.71	3.37
Coop. Extension - specialist	3.76	4.28	3.89	3.89	4.04	3.68	3.48
University professor	3.70	4.05	3.74	3.72	3.86	3.59	2.84
Vocational agriculture teacher	3.75	3.00	3.73	3.72	3.28	3.67	3.64
Veterinary consultant	4.00	4.15	4.37	4.16	4.31	4.27	4.02

NC-191 survey for the 1990 production year.
Sample statistics are weighted to be representative of the 13 state region.
* Importance score ranged from 1 (low) to 5 (high).

Summary

Results of the NC-191 survey document the assortment of accounting systems used on U.S. farms. It is apparent that many farmers continue to keep financial records primarily to document income tax liabilities and/or to meet other external reporting requirements. For instance, 2 percent of the farmers reported entry of financial transactions data only once annually. More than half the farmers entered transactions data only once per month. The average farmer spent only 8.2 hours per month keeping and analyzing farm records. On the other hand, internal uses of the financial records (profitability assessment, monitoring cash flows) were very highly rated uses of financial records.

The survey results document strong relationships between operator education level

and firm gross sales and several indicators of farm records design and use. Adoption of computer-based and double-entry accounting designs are influenced by operator education level and the size of the business. Farmers' stated opinions are that computers are most useful for such items as financial accounting, planning, and management. Combine this with the lack of a clear connection between the data collected and the financial information that farmers want and we may have a better insight into why farmers have not adopted computers as rapidly as expected, and why there typically is a long time lag from computer adoption until the farmer views the computer as useful.

Even with small, part-time farms excluded, computers have been adopted by less than one-third of the farmers in the thirteen-state study area. Computer adoption is strongly associated with business size and operator education level, and inversely associated with operator age. However, most farmers who have adopted computers find them to be a useful tool of management.

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Chapter 3

Farm Information Systems for Cash Grain, Forage and Fiber Farms

Robert P. King and Craig L. Dobbins

Grain, forage, and fiber crop farms are those whose primary enterprise is the production of grain, oilseed, forage, and/or fiber crops. Farms in this category (which are called "crop farms" throughout the remainder of this chapter) do not have significant livestock or specialty crop enterprises. As reported in Table 1.3, these farms make up 37.8 percent of the farms in the 13 state region. As such, they are the largest farm category.

The distribution of crop farms across states and farm size categories is shown in the top portion of Table 3.1. Crop farms account for the largest proportion of survey respondents in Illinois, Iowa, and North Dakota. In these states, 50 percent or more of the farms were classified as crop farms. Of the four farm size categories, the 500 - 999 acre category was the largest in all states except Iowa, Michigan, North Dakota, and Oregon. For Iowa, Michigan, and Oregon, 200 - 499 acres was the largest size category. North Dakota, on the other hand, had a greater proportion of farms in the large size categories than other states. This is not unexpected, since larger farm sizes are common in the more extensively-farmed northern Great Plains. It is noteworthy that 42 percent of the farms in the largest size category are located in North Dakota.

The size of crop farms, measured in terms of crop acreage, is associated with enterprise mix. Most of the many crop farms located across the Corn Belt in Illinois, Indiana, Iowa, Michigan, Minnesota, and Ohio have corn, soybeans, and wheat as their major crop enterprises. Most of the crop farms in North Dakota, and many of those in Oklahoma and Oregon, have wheat as their primary enterprise. The crop farms located in Texas raise a mix of crops that often includes cotton. Finally, crop farms in New York, North Carolina, and Wisconsin raise a diverse mix of crops.

The age distribution for operators of farms in this category is also shown in Table 3.1. As expected, operators were relatively evenly distributed over the age range from thirty through fifty-nine years old, and nearly all fell in the range from thirty through sixty-nine years of age.

Table 3.1. Grain, forage and fiber crop farms distributed by state, operator age and farm size.

	Farm Size (Cropped Acres)				Total
	200 - 499	500 - 999	1,000 - 1,999	More than 2,000	
State	Number				
Illinois	41	76	20	3	140
Indiana	27	50	23	6	106
Iowa	50	35	7	0	92
Michigan	21	19	5	0	45
Minnesota	28	29	11	3	71
New York	8	1	3	0	12
North Carolina	9	9	2	2	22
North Dakota	12	22	36	15	85
Ohio	28	49	21	2	100
Oklahoma	10	24	7	1	42
Oregon	2	1	1	0	4
Texas	9	30	18	4	61
Wisconsin	8	4	2	0	14
Total	253	349	156	36	794
Age of operator					
Less than 30	8	7	3	1	19
30 - 39	45	82	40	16	183
40 - 49	53	85	50	10	198
50 - 59	56	87	37	5	185
60 - 69	62	60	17	3	142
70 and over	15	9	2	0	26

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Financial Records

Presented in Table 3.2 is information about the financial records systems of the crop farms responding to this survey. Most farms, 62.8 percent overall, kept internal financial records only. Most of the remaining farms, 25.8 percent overall, kept financial records internally and used some type of external records service. The percentage of farms with internal records only decreased steadily as farm size increased, while the opposite was true for farms whose financial records systems had both internal and external components.

More than two-thirds (67.7 percent) of the crop farms maintained their internal financial records manually, while 15.6 percent used a computer-based system for their records, and 15.2 percent maintained their records both manually and on a computer. The proportion of farmers using a computer based system, either exclusively or in combination with manual records, increased steadily with farm size. Nearly half the farms in the 1,000 -

1,999 size category and more than half the farms in the largest size category made some use of computerized records systems.

Table 3.2. Description of farmers' financial records systems - Grain, forage and fiber crop farms.

Measure	Farm Size (Cropped Acres) 200 - 499	500 - 999	1,000 - 1,999	More than 2,000	Total
	Percent				
Record-keeping method					
Use external records service only	6.7	5.5	7.1	5.6	6.2
Keep internal financial records only	65.1	63.1	60.0	55.6	62.8
Have both internal and external components	19.8	27.1	29.7	38.9	25.8
Keep no financial records	8.3	4.3	3.2	.0	5.2
Total	100.0	100.0	100.0	100.0	100.0
Media used for internal farm financial records					
Manual records system	80.0	69.5	50.4	47.1	67.7
Computer-based records system	8.3	14.8	26.7	23.5	15.6
Both manual and computer-based components	9.3	14.8	22.2	26.5	15.2
Mail-in records system	2.4	1.0	.7	2.9	1.5
Total	100.0	100.0	100.0	100.0	100.0
Accounting method employed					
Single-entry accounting	80.3	76.5	56.8	55.9	72.4
Double-entry accounting	19.7	23.5	43.2	44.1	27.6
Total	100.0	100.0	100.0	100.0	100.0
Type of computer-based financial records					
General business accounting software	24.4	26.3	22.7	22.2	24.5
Accounting package designed for farm firms	43.9	46.3	59.1	61.1	50.9
Accounts maintained using an electronic spreadsheet	12.2	11.6	9.1	5.6	10.5
Accounts maintained using database management software	7.3	4.2	3.0	.0	4.1
Mail-in records system	12.2	6.3	4.5	5.6	6.8
Other	.0	5.3	1.5	5.6	3.2
Total	100.0	100.0	100.0	100.0	100.0
Person primarily responsible for keeping financial records					
Operator	72.7	70.8	63.0	70.6	69.8
Partner in the farming business	1.0	1.6	2.2	2.9	1.6
Spouse or other family member	26.3	26.9	32.6	26.5	27.8
Hired employee	.0	.7	2.2	.0	.7
Total	100.0	100.0	100.0	100.0	100.0
Hours per month spent keeping and analyzing farm records					
Less than 10 hours/month	80.7	73.3	66.2	50.0	73.1
10 - 24 hours/month	15.5	22.8	29.1	44.1	22.7
25 - 49 hours/month	3.0	4.0	2.7	2.9	3.4
More than 50 hours/month	.9	.0	2.0	2.9	.8
Total	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

On farms that use a computer for at least some of their accounting, accounting packages designed specifically for farm firms were the most widely used, and the percentage of farms using specialized farm accounting packages increased consistently with farm size. The percentage of farms using general business accounting software was relatively stable across size categories at nearly 25 percent.

For crop farms of all sizes, the operator was most frequently responsible for maintaining financial records. The operator's spouse or another family member was

responsible for financial records in nearly all other cases. The management team in most crop farm operations spent less that ten hours per month keeping and maintaining farm records, although the amount of time spent on these tasks increased with farm size.

Crop Enterprise Records

Information on crop enterprise records systems is presented in Table 3.3. A variety of methods were used to maintain crop enterprise records. Pocket notebooks were used on most farms (72.2 percent overall). Field record books and notes on calendars were also widely used. A small percentage of farms used computerized systems to maintain crop records. Farms that used computerized crop records systems were evenly divided between those that used a purchased crop records package and those that used a database of their own design. With movement across farm size categories from smaller to larger farms, there was an increase in the use of more formal methods for keeping crop records, such as field record books and computerized crop records systems. To a large extent, these seem to supplement the less formal pocket notebook and notes on calendars.

Table 3.3. Crop enterprise records systems - Grain, forage and fiber crop farms.

Method of measure	Farm Size (Cropped Acres)				Total
	200 - 499	500 - 999	1,000 - 1,999	More than 2,000	
	Percent				
Notes on calendars	36.5	31.7	27.5	25.7	32.1
Pocket notebook	70.7	73.3	73.9	65.7	72.2
Field records book	40.2	49.4	49.7	68.6	47.4
Computerized crop records program	5.6	6.1	16.3	14.3	8.3
Computer data base of own design	5.6	8.7	15.7	11.4	9.2
Crop information kept in the crop records					
Fertilizer used	81.2	90.6	87.6	91.2	87.0
Manure applied	14.8	10.4	8.6	5.9	11.2
Herbicides applied	77.9	88.7	84.3	85.3	84.2
Insecticides or fungicide applied	51.4	69.6	68.6	70.6	63.7
Machinery operations performed	38.9	41.2	47.1	23.5	40.9
Yield	71.3	84.9	90.9	91.2	82.1
Moisture of crops	34.2	38.0	37.9	32.4	36.5
Costs of production and revenue	61.9	72.4	70.6	61.8	68.2
Irrigation scheduling/amounts	3.3	5.3	6.6	5.9	5.0
Percent keeping records (or charts) of commodity price					
Local cash prices	41.8	46.4	51.7	47.1	46.1
Futures market prices	21.6	22.5	32.9	29.4	24.7
Forward contract bids	14.1	21.5	26.6	17.6	20.1

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

The types of information maintained in crop enterprise records systems was similar across all size categories. Records of fertilizer used, herbicide applications, crop yields, and enterprise costs were commonly maintained.

Finally, marketing decisions are often critical for the success of crop farms. It is not surprising, then, that a significant proportion of farms in all size categories maintain historical records of cash and/or futures and forward contract prices.

Table 3.4 presents information on the importance of farm records in supporting selected crop production and investment decisions for crop farms. For each decision, respondents were asked to assign an importance score ranging from 1 (low importance) to 5 (high importance). Two general observations can be made about these results. First, larger farms tend to assign higher importance scores for both crop and investment decisions. This suggests that they rely more on formal records systems than do managers of smaller farm operations. It may also suggest that managers of larger farms may be willing to pay more for relatively sophisticated farm records systems and services. Second, while relative

Table 3.4. Importance of farm records system for making farm decisions - Grain, forage and fiber crop farms. *

Decision	Farm Size (Cropped Acres)				Total
	200 - 499	500 - 999	1,000 - 1,999	More than 2,000	
Crop decisions					
Fertilization amount	3.81	4.01	3.89	4.06	3.92
Pesticide amount and timing	3.32	3.61	3.60	3.65	3.52
Crop variety	3.63	3.95	3.81	3.75	3.81
Tillage system	3.25	3.41	3.37	3.03	3.34
What crops to plant by field	3.58	3.83	3.83	3.76	3.75
Evaluating crop insurance	2.45	2.57	2.76	2.80	2.58
How and when to market	3.37	3.74	3.78	3.90	3.64
Evaluating govt. programs	3.09	3.54	3.69	3.69	3.44
Determining land rental rates	2.57	3.22	3.41	3.45	3.08
Irrigation scheduling	1.58	1.87	1.94	2.00	1.80
Investment decisions					
When to trade equipment	2.92	3.29	3.17	3.39	3.16
When to build/expand buildings	2.42	2.58	2.65	2.64	2.55
Evaluating lease/purchase of land	2.78	3.32	3.36	3.70	3.18
Evaluating lease/purchase of machinery	2.81	3.29	3.27	3.41	3.14
Borrowing money	3.31	3.87	4.00	3.88	3.73
Tax planning	3.92	4.23	4.33	4.26	4.16
Evaluating profitability of the farm	4.02	4.29	4.43	4.42	4.25
Home vs. business use of finances	3.06	3.10	3.33	2.97	3.13

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Importance score ranged from 1 (low) to 5 (high).

importance rankings tend to differ across farm size categories, the same decisions tend to be ranked high in importance for farms of all sizes. Among crop production decisions, for example, deciding fertilization amount was ranked highest in importance for all farm size categories. Crop variety selection, deciding what crops to plant in each field, and deciding how and when to market were also ranked highly by farms of all sizes. Among investment decisions, records were most important for evaluating profitability, tax planning, and borrowing money for farms of all sizes. This homogeneity of importance rankings suggests that basic functions and features required for farm records systems do not change dramatically with farm size.

Adoption and Use of Computers

Computer adoption percentages and usefulness evaluations are presented in Table 3.5. Levels of computer adoption increased dramatically with farm size, ranging from 13.9 percent for farms in the smallest size category to 52.8 percent for farms in the largest size category. Computer usefulness scores and hours of computer used per month also increased with farm size, but not as sharply as adoption rates. Finally, farms in all size categories needed approximately seven months from the purchase of a new computer before it became a truly useful management tool.

Table 3.5. Percentage of farmers adopting computers and their evaluation of its usefulness for management - Grain, forage and fiber crop farms.

Measure	Farm Size (Cropped Acres)				Total
	200 - 499	500 - 999	1,000 - 1,999	More than 2,000	
Computer adoption percent.....	13.9	27.7	40.9	52.8	27.1
Computer usefulness score *.....	3.7	3.9	4.1	4.3	4.0
Hours of computer use per month @.....	9.0	11.5	14.1	15.1	12.2
Months before computer is useful #.....	7.3	6.4	7.3	7.2	7.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Hours of use of computer for farm management tasks.
# Months from computer purchase until the computer was felt to be useful as a management tool.

The top panel of Table 3.6 presents information about how farmers who own computers use them. In general, the percentage of farms using computers for each task increased with farm size, suggesting that larger farmers tend to use computers to support a wider variety of tasks. There was a consistent upward trend for accounting, business planning, and marketing. This trend was reversed for farms in the largest size category for tax computation, business correspondence, crop production recordkeeping, and access to

electronic information services. In some cases, this may indicate an increased willingness of large farmers to use consultants for information management tasks. It may also be attributable to differences in location and/or enterprise mix for large farms.

Table 3.6. Management tasks for which the computer is used and its helpfulness rating - Grain, forage and fiber crop farms.

Task	Farm Size (Cropped Acres) 200 - 499	500 - 999	1,000 - 1,999	More than 2,000	Total
	Percent using				
Business financial accounting	88.6	86.0	90.3	94.7	88.6
Business planning	60.0	77.9	81.0	89.5	76.8
Tax computation	60.0	67.4	74.2	63.2	67.8
Business correspondence	50.0	56.5	59.7	42.1	55.0
Herd production recordkeeping	8.8	11.0	10.0	.0	9.3
Crop production recordkeeping	52.9	62.4	73.0	47.4	62.7
Marketing and price analysis	20.6	28.6	46.0	47.4	34.5
Access to an electronic information service	8.8	13.3	24.6	21.1	16.8
	Helpfulness score *				
Business financial accounting	4.06	4.54	4.48	4.71	4.45
Business planning	3.81	4.22	4.39	4.27	4.22
Tax computation	4.24	4.51	4.23	4.00	4.33
Business correspondence	3.71	3.77	3.76	3.50	3.74
Herd production recordkeeping	3.50	4.00	4.17	.	4.00
Crop production recordkeeping	4.11	4.06	3.86	3.89	3.98
Marketing and price analysis	3.29	4.08	3.74	3.56	3.79
Access to an electronic information service	2.00	4.20	3.43	3.00	3.48

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Helpfulness score ranged from 1 (low) to 5 (high).

The lower panel of Table 3.6 presents information on the helpfulness of computer support for these tasks. These helpfulness ratings are high for most tasks. There does not appear to be a strong, consistent trend in helpfulness ratings across size categories.

Information in Table 3.7 addresses how farmers who own computers allocated the time they spend using them among different categories of software applications. For farms in all size categories, nearly half the time spent using a computer was allocated to the use of an accounting package. Electronic spreadsheet and word processing packages received the next largest time allocation. Other applications were used less frequently.

Table 3.7. Percentage of time that the farm computer is used for various computer software applications - Grain, forage and fiber crop farms.

Software application	Farm Size (Cropped Acres)				Total
	200 - 499	500 - 999	1,000 - 1,999	More than 2,000	
Business accounting software package	45.7	40.5	49.2	48.4	44.9
Tax computation package	12.2	3.7	3.1	2.4	4.8
Electronic spreadsheet software	14.0	20.9	18.7	19.9	19.0
Word processing software	14.8	15.2	11.8	12.9	13.9
Data base management software	2.7	3.3	4.3	1.6	3.3
Market price analysis software package	2.3	2.1	2.0	.6	1.9
Crop recordkeeping software	7.8	7.8	6.1	5.4	7.0
Livestock recordkeeping software	.0	1.1	.5	.0	.6
Other	.5	5.3	4.2	8.7	4.5

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Computerized information networks were an important source of market and weather information for many farmers. Table 3.8 presents information on adoption and use of these services by crop farms. Approximately 16 percent of the crop farms responding to this survey used a computerized information service. The rate of adoption increased sharply with farm size, from 6.4 percent for the smallest farm size category to 25 percent for the largest. These services were given consistently high usefulness scores by farmers in all size categories.

Table 3.8. Farmers' use of computerized information systems (CIS) - Grain, forage and fiber crop farms.

Measure	Farm Size (Cropped Acres)				Total
	200 - 499	500 - 999	1,000 - 1,999	More than 2,000	
CIS adoption percent	6.40	17.05	27.74	25.00	16.14
CIS usefulness score *	4.05	4.12	4.23	4.18	4.15
Annual expenditure @	164.11	297.69	315.80	168.22	276.00

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Total expenditure for all CIS sources

Use of Professional Consultants

Consultants and other professional services are a potentially important part of any farm's information system. Table 3.9 presents information on the use and usefulness of professional services for crop farms. Farms in all size categories made extensive use of accountants and financial advisors, tax preparers, crop consultants, and Extension agents and specialists. The use of financial advisors and crop consultants increased steadily with farm size. On the other hand, there does not seem to be a consistent trend in the use of tax preparers and Extension agents and specialists. Helpfulness scores were consistently high for all services identified in the survey instrument, and there was no apparent pattern of increase or decrease in helpfulness scores across farm sizes.

Table 3.9. Professional services used during the past two years as a source of information and usefulness ratings - Grain, forage and fiber crop farms.

Source	Farm Size (Cropped Acres)				Total
	200 - 499	500 - 999	1,000 - 1,999	More than 2,000	
	Percent using				
Accountant or financial advisor	30.0	47.1	53.0	68.6	43.9
Farm records association agent	9.1	13.5	11.9	8.6	11.6
Tax preparer	80.3	82.6	80.8	71.4	81.0
Livestock management advisor	3.3	1.5	.7	.0	1.8
Crop/pest management consultant	33.2	39.1	43.7	48.6	38.6
Computer software vendor/advisor	5.0	7.9	14.6	20.0	8.9
Computer hardware vendor/advisor	3.3	6.8	13.2	17.1	7.4
Farm management consultant	8.7	10.9	10.7	5.7	9.9
Coop. Extension - county agent	53.7	54.1	53.0	54.3	53.8
Coop. Extension - specialist	26.1	27.6	29.8	28.6	27.6
University professor	7.5	9.1	19.9	25.7	11.5
Vocational agriculture teacher	7.1	6.5	7.3	2.9	6.6
Veterinary consultant	25.9	15.9	14.7	.0	18.1
	Helpfulness score *				
Accountant or financial advisor	4.02	4.15	4.29	4.26	4.16
Farm records association agent	4.00	4.45	3.93	4.50	4.24
Tax preparer	4.29	4.45	4.32	4.33	4.37
Livestock management advisor	3.86	4.75	1.00	.	3.92
Crop/pest management consultant	4.01	4.24	4.08	4.06	4.14
Computer software vendor/advisor	3.45	3.46	3.23	3.67	3.40
Computer hardware vendor/advisor	3.50	3.05	3.21	3.80	3.25
Farm management consultant	3.67	4.24	4.13	4.50	4.07
Coop. Extension - county agent	3.74	3.66	3.66	3.59	3.68
Coop. Extension - specialist	3.69	3.68	3.95	3.78	3.75
University professor	3.50	3.61	3.93	4.00	3.74
Vocational agriculture teacher	3.88	3.73	3.41	4.00	3.71
Veterinary consultant	3.93	4.02	4.00	.	3.98

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Importance score ranged from 1 (low) to 5 (high).

In general, the findings of this study suggest that the managers of crop farms make extensive use of farm records, external information sources, and professional advisory services. As is true for farms specializing in other enterprises, formalization of the farm information system tends to increase with farm size. Increased formalization is often achieved by computerizing recordkeeping and planning activities that can be done more informally in a smaller, less complex farm operation.

Chapter 4

Information Systems for Fruit, Vegetable, Nursery, and Specialty Crop Farms.

Tim L. Cross and William A. Amponsah

Farms that produce primarily fruits, vegetables, nursery crops, and other specialty crops (such as herbs, flowers, and tobacco) are classified as specialty crop farms and are referred to in this chapter as "specialty farms." Specialty farms represent only about 6 percent of the farms in the study region. However, specialty farms represent significant portions of the agricultural industry in various regions of the U.S..

According to Table 4.1, 165 farms were classified as specialty farms in this study. Specialty farm size is measured in cropped acreage. These farms tend to be smaller than other farm types. Therefore, in this study a specialty farm is considered to be relatively small when its size is between 20 and 99 acres, and relatively large when its size is 100 or more acres.

Table 4.1. Fruit, vegetable, nursery and specialty crop farms distributed by state, operator age and farm size.

	Farm Size (Cropped Acres)				Total
	20 - 49	50 - 99	100 - 199	More than 200	
State	Number				
Illinois	0	1	0	0	1
Iowa	0	0	0	1	1
Michigan	10	9	8	10	37
Minnesota	0	0	0	3	3
New York	5	10	7	5	27
North Carolina	16	10	4	2	32
North Dakota	0	0	0	2	2
Ohio	4	1	1	0	6
Oklahoma	0	0	0	2	2
Oregon	18	12	12	7	49
Texas	2	1	0	1	4
Wisconsin	1	0	0	0	1
Total	56	44	32	33	165
Age of operator					
Less than 30	2	1	0	0	3
30 - 39	5	9	5	10	29
40 - 49	16	10	10	6	42
50 - 59	14	13	8	10	45
60 - 69	16	6	3	3	28
70 and over	2	4	3	0	9

NC-191 survey for the 1990 Production Year. Sample statistics are unweighted and, thus, are representative only of the sample.

Most specialty farms in the sample are from New York, North Carolina, and Oregon. The traditionally leading states in the production of fresh fruits and other specialty crops such as Arizona, California, Florida, Georgia, Kentucky and Texas, were not sampled in the study. Very few specialty farms were reported in the Midwest and Southwest regions. Distributions of specialty farms by size are quite similar among the states, with the most common size being 20 to 49 acres. Specialty farms generally require intensive management, but do not require vast land holdings to generate income. Specialty farms achieved the second largest average net farm income in the sample of $35,820 (Table 1.4).

In addition, from Table 4.1, no apparent correlation can be drawn between the age of specialty farm operators and their farm size. Rather, there appears to exist a fairly uniform distribution of age groups, when evaluated by farm size categories. On the aggregate, however, most operators were between the ages of 40 and 59.

Financial Information Systems

Financial records systems used on specialty farms are described in Table 4.2. Overall, internal financial records were kept by slightly more than half of all specialty farms. About one third of specialty farms maintained both internal and external financial records, and few maintained only external records. Smaller farms tended to rely most heavily on internal financial recordkeeping. For those farms between 20 and 49 acres, a surprisingly high number (12.7%) kept no financial records at all. Larger specialty farms tended to rely more heavily on external record-keeping services.

Most specialty farms of less than 100 acres in size used manual records systems. Of the farms that used computers for their financial records, a majority were larger than 100 acres. Just 17 percent of the specialty farms used both computer and manual systems for their financial records.

Slightly more than half the specialty farms maintained single-entry accounting records, while the rest used double-entry systems. Among those specialty farms that used double-entry records, the use of double-entry records increased with farm size. This suggests that larger specialty farms are more concerned with accrual records. Given the nature of specialty crop production and sales, where production and revenues are often spread over multiple fiscal years, the greater use of double-entry accounting systems by large specialty farms is to be expected.

Table 4.2 also shows that the two most commonly-used software programs for managing financial records were general business accounting programs and farm-specific accounting programs. Electronic spreadsheets were mentioned by a few respondents as the source of computerized financial records. The operator, the operator's spouse, or other family members were the persons most often responsible for keeping financial records. However, a small percentage of large specialty farms used hired employees for financial

recordkeeping. Hired employees probably are needed because of the volume of transactions and/or payroll activities associated with those farms. Even though a majority of all size categories reported spending less than 10 hours per month in keeping and analyzing records, the larger farms usually spent relatively more time on the average on such activities.

Table 4.2. Description of farmers' financial records systems - Fruit, vegetable, nursery and specialty crop farms.

Measure	Farm Size (Cropped Acres)				Total
	20 - 49	50 - 99	100 - 199	More than 200	
	Percent				
Record-keeping method:					
Use external records service only	1.8	2.3	3.1	12.1	4.3
Keep internal financial records only	54.5	54.5	53.1	39.4	51.2
Have both internal and external components	30.9	34.1	40.6	42.4	36.0
Keep no financial records	12.7	9.1	3.1	6.1	8.5
Total	100.0	100.0	100.0	100.0	100.0
Media used for internal farm financial records:					
Manual records system	72.3	71.8	46.4	57.7	64.3
Computer-based records system	8.5	15.4	25.0	23.1	16.4
Both manual and computer-based components	17.0	10.3	28.6	15.4	17.1
Mail-in records system	2.1	2.6	.0	3.8	2.1
Total	100.0	100.0	100.0	100.0	100.0
Accounting method employed:					
Single-entry accounting	65.6	54.3	45.5	56.0	56.1
Double-entry accounting	34.4	45.7	54.5	44.0	43.9
Total	100.0	100.0	100.0	100.0	100.0
Type of computer-based financial records:					
General business accounting software	27.3	27.3	23.1	36.4	28.3
Accounting package designed for farm firms	36.4	27.3	46.2	45.5	39.1
Accounts maintained using an electronic spreadsheet	18.2	9.1	15.4	9.1	13.0
Accounts maintained using database management software	.0	9.1	7.7	.0	4.3
Mail-in records system	9.1	18.2	.0	9.1	8.7
Other	9.1	9.1	7.7	.0	6.5
Total	100.0	100.0	100.0	100.0	100.0
Person primarily responsible for keeping financial records:					
Operator	60.4	53.8	53.6	61.5	57.4
Partner in the farming business	2.1	.0	7.1	.0	2.1
Spouse or other family member	33.3	46.2	32.1	30.8	36.2
Hired employee	4.2	.0	7.1	7.7	4.3
Total	100.0	100.0	100.0	100.0	100.0
Hours per month spent keeping and analyzing farm records:					
Less than 10 hours/month	70.2	62.2	56.7	53.1	61.6
10 - 24 hours/month	19.1	27.0	30.0	37.5	27.4
25 - 49 hours/month	8.5	8.1	6.7	6.3	7.5
More than 50 hours/month	2.1	2.7	6.7	3.1	3.4
Total	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 Production Year. Sample statistics are unweighted and, thus, are representative only of the sample.

Crop Records Systems

The frequencies of crop enterprise records systems used by specialty farms are shown in Table 4.3. Results do not appear to differ significantly by farm size, suggesting that specialty farm enterprise records vary little between small and large farms.

Table 4.3. Crop enterprise records systems -- Fruit, vegetable, nursery and specialty crop farms.

Method or measure	Farm Size (Cropped Acres)				Total
	20 - 49	50 - 99	100 - 199	More than 200	
	Percent				
Notes on calendars	45.3	46.5	33.3	43.8	43.0
Pocket notebook	34.0	44.2	60.0	71.9	49.4
Field records book	54.7	51.2	53.3	62.5	55.1
Computerized crop records program	5.7	18.6	10.0	15.6	12.0
Computer data base of own design	3.8	7.1	30.0	12.5	11.5
Crop information kept in the crop records.					
Fertilizer used	78.4	76.7	96.7	90.3	83.9
Manure applied	17.6	23.3	26.7	6.5	18.7
Herbicides applied	80.4	86.0	96.7	90.3	87.1
Insecticides or fungicide applied	86.3	79.1	83.3	87.1	83.9
Machinery operations performed	45.1	53.5	40.0	54.8	48.4
Yield	62.7	76.7	80.0	90.3	75.5
Moisture of crops	19.6	27.9	30.0	25.8	25.2
Costs of production and revenue	64.7	69.8	90.0	80.6	74.2
Irrigation scheduling/amounts	27.5	34.9	20.0	19.4	26.5
Percent keeping records (or charts) of commodity price					
Local cash prices	40.0	47.2	23.3	30.0	36.0
Futures market prices	.0	.0	6.7	6.7	2.9
Forward contract bids	5.0	.0	3.3	3.3	2.9

NC-191 survey for the 1990 Production Year. Sample statistics are unweighted and, thus, are representative only of the sample.

The most common methods of recording crop records in order of importance were field record books, pocket notebooks, and notes on calendars. Computerized crop records systems were maintained by only a few specialty farms. This is probably because few crop record-keeping systems are available that are designed for specialty crops, and it is costly to build custom systems. Regardless of the type of system used, most specialty farms identified records of fertilizer, herbicide, insecticide, and fungicide applications as the most commonly kept data. Enterprise cost, return, and yield data were also kept by 75 percent of respondents. Very little price information was recorded. Additionally, from our definition of specialty crops, with the probable exception of fruits (such as oranges), most specialty crops do not use the services of futures markets.

Records Usefulness

To determine the usefulness of farm records, specialty farmers were asked to rate the importance of using crop records in making crop and investment decisions. The ratings were on a scale of one (low importance) to five (high importance). Table 4.4 shows the results of these ratings, which again do not appear to differ by farm size.

Table 4.4. Importance of farm records system for making farm decisions - Fruit, vegetable, nursery and specialty crop farms. *

Decision	Farm Size (Cropped Acres)				Total
	20 - 49	50 - 99	100 - 199	More than 200	
Crop decisions					
Fertilization amount	3.80	3.92	4.07	3.90	3.91
Pesticide amount and timing	4.42	4.22	4.44	4.19	4.32
Crop variety	3.63	3.88	3.25	3.77	3.66
Tillage system	2.54	3.03	2.39	3.00	2.76
What crops to plant by field	3.26	3.16	2.83	3.37	3.18
Evaluating crop insurance	1.70	2.45	2.13	2.15	2.10
How and when to market	2.86	2.97	2.24	2.74	2.73
Evaluating govt. programs	1.73	1.90	1.73	2.56	2.00
Determining land rental rates	2.00	2.24	1.70	2.87	2.22
Irrigation scheduling	2.74	2.88	3.42	2.11	2.82
Investment decisions					
When to trade equipment	3.05	3.29	3.19	2.97	3.13
When to build/expand buildings	2.79	3.13	2.79	2.42	2.79
Evaluating lease/purchase of land	2.10	2.69	2.54	2.94	2.57
Evaluating lease/purchase of machinery	2.35	2.50	3.21	2.87	2.71
Borrowing money	3.21	3.48	4.11	3.45	3.54
Tax planning	4.06	3.92	4.27	4.31	4.12
Evaluating profitability of the farm	4.34	4.11	4.85	4.07	4.32
Home vs. business use of finances	3.35	3.25	3.17	2.83	3.16

NC-191 survey for the 1990 Production Year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Importance score ranged from 1 (low) to 5 (high).

The two most important uses of records for specialty crop decisions were pesticide amount and timing, and fertilization amounts; both received ratings of about four. Low ratings were assigned to government program evaluations and evaluating crop insurance, both of which are often not applicable to or available for specialty crops.

Farm records used for investment decisions are perceived to be more important when applied in evaluating farm profitability and tax planning. However, low scores for investment decisions were assigned to the evaluation of land and machinery leasing or purchasing. These low scores were recorded for all size categories of farms, implying that technical scale economies were not perceived to be very important by all size categories of

specialty farms. This probably explains why most of the specialty farms surveyed tended to be small.

Computer Adoption

Consistent with the importance score attached to investment planning for farm profitability and tax purposes, the frequency of computer adoption by specialty farms was fairly high (see Table 2.13) when compared to all other farm types. Also, from Table 4.5, larger farms (especially those between 100 and 199 acres) had the highest computer adoption rate (about 50%), even though the importance of computers was acknowledged by farmers in all categories of farm size.

Table 4.5. Percentage of farmers adopting computers and their evaluation of its usefulness for management -- Fruit, vegetable, nursery and specialty crop farms.

Measure	Farm Size (Cropped Acres)				Total
	20 - 49	50 - 99	100 - 199	More than 200	
Computer adoption percent.....	23.6	36.4	50.0	42.4	36.0
Computer usefulness score *.....	3.9	4.1	4.3	4.3	4.1
Hours of computer use per month @.....	19.0	22.4	97.4	28.4	44.4
Months before computer is useful #.....	6.7	7.8	3.8	6.8	6.3

NC-191 survey for the 1990 Production Year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Hours of use of computer for farm management tasks.
# Months from computer purchase until the computer was felt to be useful as a management tool.

Most specialty farms reported that six to eight months were required, on average, from the time of purchase of computers until the computer was judged to be useful on their farm. This finding is consistent with the learning curves experienced by other types of farms. Specialty farms of 100 to 199 acres were an exception to this, reporting only 3.8 months for computers to become useful. The reason for this difference is unclear, but it seems that specialty farms of 100 to 199 acres are perhaps making more intense use of computers than other specialty farms. Consistent with this idea is the reported hours of computer use by month which shows these farms spending approximately four times as many hours on computers compared to other sizes of specialty farms.

The tasks for which computers are used are shown in Table 4.6. Several differences are apparent among the size categories. Among smaller farms, more than 50 percent used computers for business correspondence, financial accounting, business planning, crop recordkeeping, and tax computation. On the average, larger farms reported slightly greater frequencies of computer application in financial accounting, tax computation, and crop

recordkeeping. Marketing and price analyses, and access to electronic information services, were infrequently used by any specialty farms.

Table 4.6. Management tasks for which the computer is used and its helpfulness rating - Fruit, vegetable, nursery and specialty crop farms.

Task	Farm Size (Cropped Acres)				Total
	20 - 49	50 - 99	100 - 199	More than 200	
	Percent using				
Business financial accounting	75.0	62.5	87.5	69.2	73.7
Business planning	75.0	56.3	68.8	69.2	66.7
Tax computation	50.0	43.8	50.0	69.2	52.6
Business correspondence	83.3	56.3	53.3	84.6	67.9
Herd production recordkeeping	.0	6.3	6.3	25.0	9.1
Crop production recordkeeping	50.0	37.5	56.3	61.5	50.9
Marketing and price analysis	9.1	12.5	25.0	23.1	17.9
Access to an electronic information service	.0	.0	18.8	7.7	7.1
	Helpfulness score *				
Business financial accounting	4.5	4.7	4.9	4.6	4.7
Business planning	3.0	4.5	4.8	4.1	4.2
Tax computation	4.0	4.5	4.4	4.3	4.3
Business correspondence	4.3	3.6	3.3	3.4	3.6
Herd production recordkeeping	.	4.0	5.0	4.7	4.6
Crop production recordkeeping	4.2	3.8	4.4	4.1	4.2
Marketing and price analysis	5.0	3.0	4.0	3.3	3.8
Access to an electronic information service	.	.	4.3	4.0	4.3

NC-191 survey for the 1990 Production Year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Helpfulness score ranged from 1 (low) to 5 (high).

Specialty farms were also asked to rate the usefulness of computers in performing the tasks just described. Differences are again apparent due to farm size. Large specialty farms (more than 200 acres in size) rated computers in financial accounting and tax computation as the most helpful, with business correspondence and market analysis tasks on computers rated least helpful. Small specialty farms of 20 to 49 acres also rated financial accounting high, but saw computers as much more helpful in business correspondence than did large farms.

The time spent on computer applications by specialty farms is shown in Table 4.7. Results here are fairly consistent among all specialty farms, with 41 percent of all computer time spent doing financial accounting. Spreadsheets accounted for 21 percent of computer use, and word processing used 14 percent of computer time. Time devoted to all other applications including crop recordkeeping was quite low.

Table 4.7. Percentage of time that the farm computer is used for various computer software applications - Fruit, vegetable, nursery and specialty crop farms.

Software application	Farm Size (Cropped Acres)				Total
	20 - 49	50 - 99	100 - 199	More than 200	
Business accounting software package	46.1	34.5	35.0	48.6	40.9
Tax computation package	.1	4.2	1.0	2.1	2.0
Electronic spreadsheet software	26.1	17.1	26.8	15.1	20.8
Word processing software	24.8	14.2	13.2	7.5	14.3
Data base management software	.6	9.2	.5	6.7	4.5
Market price analysis software package	1.2	8.3	.0	1.7	3.0
Crop recordkeeping software	1.1	4.2	12.7	3.0	5.3
Livestock recordkeeping software	.0	.0	.0	.0	.0
Other	.0	8.3	10.8	15.4	9.2

NC-191 survey for the 1990 Production Year. Sample statistics are unweighted and, thus, are representative only of the sample.

Computerized information networks were seldom used on specialty farms, as seen in Table 4.8. Only 3 percent of all specialty farms accessed electronic information services, and they rated the usefulness of the services at only 3.75, on a scale of one to five, where five is highly useful. Two explanations may account for the low usage of these services. They are 1.) very little or no information are provided by these networks which may be useful in managing specialty farms or 2.) specialty farms are unaware of such electronic services.

Table 4.8. Farmers' use of computerized information systems (CIS) - Fruit, vegetable, nursery and specialty crop farms.

Measure	Farm Size (Cropped Acres)				Total
	20 - 49	50 - 99	100 - 199	More than 200	
CIS adoption percent	3.57	.00	6.45	3.03	3.05
CIS usefulness score *	4.50	.	3.17	4.00	3.75
Annual expenditure @	175.00	.	250.00	240.00	223.33

NC-191 survey for the 1990 Production Year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Total expenditure for all CIS sources

Professional Consultants

The final aspect of specialty farm information systems explored in this study is their use of professional services. The proportion and importance score of specialty farms which use listed professional services is reported in Table 4.9 The professional services most

frequently used by specialty farms are tax preparers (71%), extension agents (67%), accountants (62%), extension specialists (48%), and crop management consultants (44.7%). They were all found to be very important by the specialty farms surveyed. University professors were infrequently used, even though they were viewed as providing important services.

Table 4.9. Professional services used during the past two years as a source of information and usefulness ratings - Fruit, vegetable, nursery and specialty crop farms.

Source	Farm Size (Cropped Acres)				Total
	20 - 49	50 - 99	100 - 199	More than 200	
	Percent using				
Accountant or financial advisor	52.9	58.1	71.9	69.7	61.6
Farm records association agent	5.9	4.7	12.5	6.1	6.9
Tax preparer	64.7	76.7	68.8	75.8	71.1
Livestock management advisor	.0	.0	3.2	6.1	1.9
Crop/pest management consultant	37.3	46.5	59.4	39.4	44.7
Computer software vendor/advisor	3.9	11.6	18.8	6.1	9.4
Computer hardware vendor/advisor	2.0	9.3	18.8	6.1	8.2
Farm management consultant	9.8	7.0	25.0	12.1	12.6
Coop. Extension - county agent	74.5	54.8	71.9	66.7	67.1
Coop. Extension - specialist	47.1	39.5	62.5	48.5	48.4
University professor	23.5	20.9	37.5	30.3	27.0
Vocational agriculture teacher	2.0	.0	6.3	3.0	2.5
Veterinary consultant	9.8	11.6	15.6	9.1	11.3
	Importance score *				
Accountant or financial advisor	4.31	4.41	4.24	4.35	4.33
Farm records association agent	4.67	5.00	3.50	4.00	4.18
Tax preparer	4.58	4.44	4.30	4.46	4.46
Livestock management advisor	.	.	1.00	3.00	2.33
Crop/pest management consultant	4.50	4.12	3.67	4.33	4.14
Computer software vendor/advisor	5.00	4.00	2.60	3.50	3.54
Computer hardware vendor/advisor	5.00	2.67	3.60	2.50	3.27
Farm management consultant	2.80	3.50	3.71	3.25	3.33
Coop. Extension - county agent	3.97	4.05	3.95	3.95	3.98
Coop. Extension - specialist	4.24	4.40	4.32	4.27	4.30
University professor	4.33	4.25	3.92	4.22	4.17
Vocational agriculture teacher	3.00	.	3.00	.	3.00
Veterinary consultant	4.75	3.80	3.80	4.00	4.06

NC-191 survey for the 1990 Production Year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Importance score ranged from 1 (low) to 5 (high).

Contrary to the very high importance attached to computer software and hardware vendors/advisors by specialty farms of 20 to 49 acres, they reported only a small percentage usage of computer vendors/advisors. Conversely, even though a greater percentage of larger farms used the services of computer vendor/advisors, their services were not highly valued by those specialty farms.

Summary

Any conclusions derived from the preceding analysis must be viewed with caution, since only a small sample of specialty farms in the U.S. were surveyed for this study. In addition, the study excluded some of the leading specialty crop producing states in the nation. Of those specialty farms surveyed, a majority were small farms. Yet, specialty farms recorded the second largest average net farm income among all the enterprises studied. Perhaps this is an indication of the highly efficient scale economies under which specialty farms function.

Most specialty farms kept some form of financial records. While smaller specialty farms relied mainly on internal records systems, larger farms relied more on external records systems. Likewise, smaller farms often used manual records systems but larger specialty farms more often used computers in their farm planning and management.

Most specialty farms maintained single entry accounting records, although the larger farms more often used double entry records. Generally, business accounting programs that related to farm investment decisions were favored, and were considered important by specialty farm operators. Crop records systems also were used by farm operators to document farm input applications and maintain general farm accounting records. They were found to be valuable in farm management. However, price information, especially futures prices, typically was not used.

Computer adoption by specialty farms was found to be high compared to the other farm types included in the survey sample. Frequently, computers found greater application in financial planning and tax computations, where they were perceived to be most useful. Greater computer time was, therefore, spent on mastering financial accounting software. On the other hand, electronic information services were not perceived to be important to specialty farms. Lastly, the key professional services used by and deemed important to specialty farms were those associated with financial accounting, tax preparation, and crop production activities.

Chapter 5

Dairy Farm Records Systems

Stephen B. Harsh, Deborah H. Streeter, and Earl Fuller

Dairy farms, those with dairy as the predominant livestock enterprise, account for nearly 24 percent of all farms in the 13 surveyed states (Table 1.3). Dairy farms are found throughout the 13 states, but are concentrated most heavily in New York and Wisconsin (Table 5.1). In the sample as a whole, about 60 percent of the surveyed farms had a herd size of 50-99, with larger herd sizes found principally in New York. Dairy farmers varied widely in age, but about a quarter of the farmers fell into each of three age groups: 30-39, 40-49, and 50-59.

Table 5.1. Dairy farms distributed by state, operator age and farm size.

	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
State	Number				
Illinois	2	7	2	0	11
Indiana	10	10	5	0	25
Iowa	6	16	1	0	23
Michigan	10	35	9	3	57
Minnesota	19	35	9	1	64
New York	15	83	36	5	139
North Carolina	1	4	6	0	11
North Dakota	4	3	0	0	7
Ohio	11	29	5	3	48
Oklahoma	0	7	3	1	11
Oregon	0	3	4	0	7
Texas	0	3	3	1	7
Wisconsin	39	110	25	1	175
Total	117	345	108	15	585
Age of operator					
Less than 30	3	10	6	1	20
30 - 39	18	89	26	3	136
40 - 49	36	94	23	3	156
50 - 59	29	85	26	6	146
60 - 69	24	44	18	0	86
70 and over	4	11	3	1	19

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Financial Accounting

Financial recordkeeping was widely practiced by the farmers in the sample. Three percent of the sample reported that they maintained no financial records (Table 5.2). Of those who kept financial records, over half kept internal financial records only. About a third kept both internal and external records. Internal financial records were kept primarily by hand (71%). About 10 percent of the operators used computer-based records systems. An additional 13 percent used some combination of manual and computer-based methods. These results varied by herd size. A high percentage of producers with large herd sizes reported some type of computer component for financial recordkeeping (28 percent for herds of 100-199, and 65 percent of herds of 200 or more).

Table 5.2. Description of farmers' financial records systems - Dairy farms by herd size.

Measure	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
	Percent				
Record-keeping method:					
Use external records service only	6.0	8.1	11.2	26.7	8.7
Keep internal financial records only	58.1	57.3	41.1	26.7	53.7
Have both internal and external components	31.6	31.1	46.7	46.7	34.5
Keep no financial records	4.3	3.5	.9	.0	3.1
Total	100.0	100.0	100.0	100.0	100.0
Media used for internal farm financial records:					
Manual records system	83.8	72.6	57.6	18.2	70.9
Computer-based records system	6.1	9.9	15.2	18.2	10.3
Both manual and computer-based components	9.1	11.6	19.6	45.5	13.4
Mail-in records system	1.0	5.8	7.6	18.2	5.5
Total	100.0	100.0	100.0	100.0	100.0
Accounting method employed:					
Single-entry accounting	78.7	67.8	71.4	50.0	70.2
Double-entry accounting	21.3	32.2	28.6	50.0	29.8
Total	100.0	100.0	100.0	100.0	100.0
Type of computer-based financial records:					
General business accounting software	23.1	19.7	11.4	44.4	19.5
Accounting package designed for farm firms	23.1	35.5	60.0	33.3	40.6
Accounts maintained using an electronic spreadsheet	30.8	15.8	5.7	11.1	14.3
Accounts maintained using database management software	.0	2.6	.0	.0	1.5
Mail-in records system	15.4	25.0	20.0	11.1	21.8
Other	7.7	1.3	2.9	.0	2.3
Total	100.0	100.0	100.0	100.0	100.0
Person primarily responsible for keeping financial records:					
Operator	49.5	45.7	43.5	36.4	45.9
Partner in the farming business	4.0	3.8	4.3	18.2	4.2
Spouse or other family member	46.5	49.8	52.2	45.5	49.5
Hired employee	.0	.7	.0	.0	.4
Total	100.0	100.0	100.0	100.0	100.0
Hours per month spent keeping and analyzing farm records:					
Less than 10 hours/month	89.0	80.4	63.7	25.0	77.8
10 - 24 hours/month	10.1	17.7	29.4	58.3	19.3
25 - 49 hours/month	.9	1.5	2.9	.0	1.6
More than 50 hours/month	.0	.3	3.9	16.7	1.3
Total	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

The bulk of dairy producers (70%) used single-entry accounting techniques (Table 5.2) There was a tendency for producers to shift from single- to double-entry accounting methods as herd size increased. Half the farmers in the largest herd size used double-entry accounting practices.

Where the computer played some role in financial recordkeeping, dairy farmers primarily used accounting software designed especially for farms (Table 5.2). Again, the largest herd size was an exception. Forty-four percent used a general business accounting software while 33 percent used packages customized for farms. These larger farms also tended to use accounting services to a greater extent.

Spouses played a major role in maintaining financial records on many dairy farms in the sample (Table 5.2). About an equal number of farms relied primarily on the spouse as the operator when it came to keeping financial records for all but the largest herd size group. For those farms with 200 or more cows milked, the task of financial recordkeeping was split among the operator (35%), a business partner (18%), and the spouse (46%).

Large farms also varied in terms of how intensely the farm records were used (Table 5.2). Most (75%) spent more than 10 hours a month keeping and analyzing farm records. For smaller farms, the majority (nearly 90%) spent less than 10 hours a month on these tasks.

Livestock Records

Tracking of dairy records was achieved primarily by manual record means (Table 5.3). Of the 10 percent of the sample that made use of computers in their livestock recordkeeping, about half used programs they designed and the other half used purchased software.

Table 5.3 also provides a list of possible information dairy farmers might keep on dairy animals. Regardless of herd size, most farms kept records on all items except the weights of offspring. For keeping track of dairy milk production, the predominant method reported was DHIA production reports.

In contrast to the consistencies found for milk production records, dairy farmers' feed records systems varied substantially by herd size. Eighty percent of the largest farms reported formalized recordkeeping, while the percentage for the other size groups was 53 or less. Also, about 50 percent of the largest dairy farms with feed records used some type of computer program, either self-designed or purchased software. By contrast, the percentage for smaller farms tended to be closer to 20.

Table 5.3. Livestock enterprise records systems -- Dairy farms.

Method or measure	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
	Percent				
Methods used for livestock records					
A manual system on paper	81.9	81.6	84.1	84.2	82.1
A computer program I designed	2.4	4.3	5.3	10.5	4.3
A computer program I purchased	3.1	5.6	8.8	5.3	5.7
A service bureau (e.g., DHIA)	40.5	51.1	48.7	52.6	48.6
Information recorded for dairy animals					
Animal health records	60.4	67.7	80.4	69.2	68.6
A schedule of when pregnant animals are due	93.4	96.2	94.8	92.3	95.3
Sires of pregnant animals	77.4	84.9	92.8	100.0	85.2
Number of offspring	50.0	68.0	75.3	69.2	65.8
Weights of offspring	8.5	14.8	17.5	30.8	14.4
Birthdates of offspring	82.1	84.5	86.6	92.3	84.6
Sire and dam of offspring	73.1	80.1	86.6	92.3	80.2
Method for recording dairy milk production					
No milk production records	21.4	14.4	8.5	14.3	14.7
DHI production reports	50.0	72.4	68.9	71.4	67.4
A service bureau other than DHI	6.3	4.1	3.8	.0	4.4
A system I designed	24.1	13.8	24.5	14.3	17.8
Do you keep records of feed fed to animals?					
No	47.0	39.1	16.8	20.0	36.0
Yes - on a total farm basis only	30.4	30.6	43.9	13.3	32.6
Yes - on a species basis only	3.5	2.9	3.7	.0	3.1
Yes - on a group level within species	3.5	10.3	24.3	60.0	12.8
Yes - on an individual animal basis	15.7	17.1	11.2	6.7	15.4
Total	100.0	100.0	100.0	100.0	100.0
Method used for feeding records					
Paper system	67.3	71.6	69.6	50.0	69.8
Self-designed computer system	1.8	5.5	4.3	25.0	5.1
Purchased computer feed records	10.9	13.7	18.8	25.0	14.6
Other	20.0	9.3	7.2	.0	10.5
Total	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Crop Records

The dominant method for keeping crop records systems on dairy farms in the sample was a pocket notebook, with 61 percent of the sample reporting use of such a method (Table 5.4). Two other important methods for all size farmers were notes on calendars and field record books. Computerized records tended to play a minor role in this area of dairy farm recordkeeping.

Table 5.4. Crop enterprise records systems - Dairy farms by herd size.

Measure	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
	Percent				
Crop records system components					
Notes on calendars	39.8	33.1	34.9	33.3	34.8
Pocket notebook	61.1	59.3	66.0	73.3	61.3
Field record book	38.0	41.6	56.6	53.3	44.0
Computerized crop records program	1.9	5.4	5.7	13.3	5.0
Computer data base of own design	2.8	3.6	3.8	13.3	3.8
Crop information kept in the crop records					
Fertilizer used	75.2	83.3	85.6	80.0	82.0
Manure applied	52.2	54.6	55.8	46.7	54.1
Herbicides applied	73.5	79.6	79.8	80.0	78.4
Insecticides or fungicide applied	48.2	49.7	59.6	60.0	51.5
Machinery operations performed	33.9	31.1	38.5	33.3	33.1
Yield	61.6	60.7	76.0	46.7	63.4
Moisture of crops	32.1	30.1	40.4	40.0	32.7
Costs of production and revenue	41.1	41.2	51.0	40.0	43.0
Irrigation scheduling/amounts	2.7	2.8	2.9	.0	2.7
Percent keeping records (or charts) of commodity price					
Local cash prices	29.6	32.6	45.0	.0	33.6
Futures market prices	5.6	8.5	10.0	.0	8.0
Forward contract bids	3.7	4.3	10.0	.0	5.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Various types of crop information were maintained by dairy farmers, such as fertilizer used, herbicides applied and yields obtained. Usage patterns showed similar patterns across farm sizes, except yield records, in which the 100-199 herd size farms reported a higher percentage keeping records.

In the area of price information, the primary information kept by operators was local cash prices. Except for the largest herd size, which reported no such recordkeeping, the percent of operators recording cash prices ranged from 30 to 45 percent. Fewer keep track of futures market prices and forward contract bids (8 and 5 percent respectively for the sample as a whole).

Usefulness of Farm Records

Table 5.5 reports the usefulness scores (ranging from one to five) for various types of decisions on the dairy farms in the sample. In the crop decision area, three types of decisions emerged as areas in which farm records were found to be especially useful: fertilization amount, crop variety, and what crop to plant by field. Among decisions that were not particularly supported by farm records were: evaluating crop insurance and

irrigation scheduling. These results are consistent across herd sizes.

Table 5.5. Importance of farm records system for making farm decisions - Dairy farms by herd size. *

Decision	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
Crop decisions					
Fertilization amount	3.59	3.64	3.97	3.91	3.70
Pesticide amount and timing	3.42	3.38	3.73	3.64	3.46
Crop variety	3.67	3.53	3.82	4.09	3.63
Tillage system	3.14	3.01	3.37	3.10	3.10
What crops to plant by field	3.61	3.49	3.86	4.36	3.61
Evaluating crop insurance	1.98	1.89	1.97	1.56	1.92
How and when to market	2.37	2.04	2.19	1.75	2.13
Evaluating govt. programs	2.42	2.33	2.37	2.82	2.37
Determining land rental rates	2.15	2.24	2.54	2.60	2.29
Irrigation scheduling	1.24	1.25	1.33	2.50	1.29
Livestock decisions					
Most economical feed ration	3.82	4.11	4.30	4.92	4.11
Health program/disease prevention	4.04	4.09	4.38	4.50	4.14
What animals to cull	4.14	4.31	4.61	4.71	4.35
What sires to use	3.98	4.06	4.28	4.54	4.10
When to breed animals	4.27	4.26	4.45	4.77	4.31
Producing vs. purchasing feed/hay	2.95	3.07	3.36	3.00	3.10
Grazing intensity - stocking rate	2.19	1.89	1.92	1.33	1.94
When to expand/contract herd size	2.33	2.24	2.57	2.85	2.34
When to market animals/products	2.66	2.39	2.83	2.82	2.54
How/where to market animals/products	2.48	2.51	2.55	2.92	2.52
Investment decisions					
When to trade equipment	2.73	2.91	3.28	3.25	2.96
When to build/expand buildings	2.57	2.69	3.19	3.33	2.78
Evaluating lease/purchase of land	2.06	2.38	2.84	2.91	2.43
Evaluating lease/purchase of machinery	2.42	2.48	2.93	3.00	2.57
Borrowing money	3.21	3.45	3.86	4.00	3.50
Tax planning	3.71	3.89	4.11	4.75	3.92
Evaluating profitability of the farm	3.77	4.12	4.48	4.86	4.14
Home vs. business use of finances	2.84	3.21	3.28	2.64	3.14

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Importance score ranged from 1 (low) to 5 (high).

Five livestock decision types earned importance scores above 4.0 for all dairy producers -- most economical feed ration, health program/disease prevention, what animals to cull, what sires to use, and when to breed. For the sample as a whole, only two decisions, grazing intensity and when to expand/contract herd sizes, consistently scored below a 2.5 in terms of usefulness.

For investment decisions, dairy farmers in the sample used records to support decisions on borrowing money, tax planning, evaluating the profitability of the farm and allocating use of finances between the home and the business. Records were deemed less

useful for evaluating lease/purchase decisions.

Adoption of Computers and Computerized Information Services

The proportion of dairy farms using computers is about the same as for other farm types responding to the survey -- 25 percent. As the farms become larger, the adoption rate greatly increases (Table 5.6). Over half of farms with more than 200 cows had adopted a computer. On the other hand, for farms with less than 100 cows, the adoption rate was about half the level of the over 200 cow herds.

Table 5.6. Percentage of farmers adopting computers and their evaluation of its usefulness for management - Dairy farms by herd size.

Measure	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
Computer adoption percent.....	12.0	25.9	32.7	53.3	25.0
Computer usefulness score *.....	3.9	4.0	4.1	3.7	4.0
Hours of computer use per month @.....	7.8	9.6	19.5	27.4	12.9
Months before computer is useful #.....	4.8	8.1	6.0	5.8	7.1

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Hours of use of computer for farm management tasks.
# Months from computer purchase until the computer was felt to be useful as a management tool.

Generally, the indicated level of usefulness was high, with an average score of four on a five-point scale. There does not seem to be any pattern with respect to herd size as to how the producers view the usefulness of the computer. One exception to this observation relates to the managers of the largest herds, who tend to give somewhat lower usefulness scores.

As one might expect, the number of hours the computer was used monthly was greater for larger herds. However, for the smallest herd (30-49 cows), the time spent on a per cow basis is about 10 percent higher than the next two larger size groups. This indicates there may be a slight economy of scale involved with respect to time spent using the computer. Dairy farmers tended to spend about 2.7 hours per month less time using the computer than the average of all farmers responding to the survey.

The number of months after purchase before the computer was considered a useful tool ranged from 4.8 for the smallest sized herds to 8.1 for 50-99 cow herds (Table 5.6). There does not appear to be a pattern with regard to herd size and the length of time before the computer was considered a useful tool.

Dairy farms have a similar pattern as others responding to the survey in terms of tasks for which they use the computer (Table 5.7). The most common task for which the computer was used was business financial accounting. Seventy-eight percent of the dairy farms with computers used the computer for this task. The next two tasks -- with about equal level of usage -- were business planning and tax computation. Another task with a high computer usage rate (54%) was the keeping of herd production records. Business correspondence and crop production record-keeping tasks accounted for only modest computer usage. For dairy farms, marketing and price analysis and access to an electronic information source did not rank high in usage, and generally were ranked lower by dairy farmers than by other groups responding to the survey. Finally, it should also be noted that the ranking of usage rates by tasks is fairly uniform across all herd sizes.

Table 5.7. Management tasks for which the computer is used and its helpfulness rating - Dairy farms by herd size.

Task	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
	Percent using				
Business financial accounting	92.3	75.7	74.2	85.7	77.6
Business planning	66.7	56.2	61.3	57.1	58.5
Tax computation	84.6	55.4	45.2	50.0	55.6
Business correspondence	54.5	38.4	41.9	42.9	41.0
Herd production recordkeeping	53.8	48.6	64.5	71.4	54.4
Crop production recordkeeping	33.3	29.7	32.3	28.6	30.6
Marketing and price analysis	16.7	5.4	3.2	14.3	6.5
Access to an electronic information service	8.3	5.5	9.7	.0	6.5
	Helpfulness score *				
Business financial accounting	4.1	4.6	4.5	4.8	4.5
Business planning	4.1	4.0	4.4	4.7	4.1
Tax computation	4.4	4.4	4.8	5.0	4.5
Business correspondence	3.5	3.7	4.0	3.5	3.7
Herd production recordkeeping	4.0	4.0	4.5	4.7	4.2
Crop production recordkeeping	4.8	3.8	3.6	3.5	3.8
Marketing and price analysis	4.0	3.2	1.0	3.0	3.1
Access to an electronic information service	5.0	2.8	4.3	.	3.6

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Helpfulness score ranged from 1 (low) to 5 (high).

In terms of helpfulness score, there is a strong correlation between the proportion of managers that use the computer for a particular task and the helpfulness score (Table 5.7). The highest helpfulness score, 4.5, was given to business financial accounting. This is also the most common task for which the computer was used. Other tasks with high helpfulness scores were tax computation, herd production recordkeeping, and business planning. These tasks also ranked high in computer usage. Tasks for which the computer was less commonly used tended to have lesser helpfulness scores (e.g., marketing and price analysis).

Slightly less than half the farm computer usage time was devoted to running business accounting software (Table 5.8). The next-largest block of time was allocated to electronic spreadsheet software. This most likely relates to the business planning tasks, a common activity for use of the farm computer. For the larger-sized herds, livestock record-keeping software also consumed a large proportion of the computer time. Indeed, for the farms with other 200 cows, this software was the second-largest user of computer time. Tax planning is a task that is ranked high in terms of computer usage and helpfulness score; however, it does not take a large amount of time. This is no doubt related to the seasonal nature of this activity. The use of database management software is very limited on the smaller dairy operations, whereas it accounts for 8 percent of the computer usage time for the over 200 cows dairy farms.

Table 5.8. Percentage of time that the farm computer is used for various computer software applications - Dairy farms by herd size.

Software application	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
Business accounting software package	35.7	46.1	46.0	35.0	44.5
Tax computation package	4.7	3.4	4.5	.0	3.7
Electronic spreadsheet software	28.8	13.0	12.9	10.0	14.5
Word processing software	24.5	12.9	6.8	10.0	12.5
Data base management software	.0	1.8	2.9	8.0	2.2
Market price analysis software package	.0	.3	.0	.0	.2
Crop recordkeeping software	5.9	4.2	4.7	.0	4.3
Livestock recordkeeping software	.4	11.4	18.6	31.0	12.9
Other	.0	6.9	3.6	6.0	5.4

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

The adoption rate of computerized information networks is not large for dairy farms, averaging just 4.12 percent (Table 5.9). This figure is only about one third of the usage noted for all survey respondents. Part of the reason for this lower usage rate likely is related to the lower importance placed on marketing and price analysis by dairy producers.

Table 5.9. Farmers' use of computerized information systems (CIS) - Dairy farms by herd size.

Measure	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
CIS adoption percent	4.27	3.50	5.56	6.67	4.12
CIS usefulness score *	4.40	4.50	4.17	5.00	4.42
Annual expenditure @	340.40	710.50	441.67	3800.00	696.12

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Total expenditure for all CIS sources

Of those dairy farms that used a computerized information network, the usefulness score was high, averaging 4.42 on a five-point scale. The usefulness of these networks was particularly high for the largest herds. The annual expenditure for accessing these networks ranged from a few hundred dollars for the under 200 cow herds to $3800 for the largest herds. This latter figure may be influenced by the low number of farms reporting data in this group.

Consultants as Information Providers

The most common professional service employed by dairy operations was the tax preparer (Table 5.10). More than 80 percent utilized this service, a figure typical of all types of operations responding to the survey. The next most important professional service employed was the veterinary consultant. This service was used on 78 percent of the farms. Another important source of information to dairy farms was the county Extension agent. Slightly more than half the dairy farms used this service. Accountants or financial advisors also were commonly used, particularly by farmers with larger herds. It appears accountants or financial advisors also assisted with tax preparation since farmers who used these services had lower reliance on tax preparers. Crop/pest management consultants provide another type of professional service used by over 40 percent of the dairy farms. However, for the largest herds, the usage rate for this service was much higher.

In terms of importance, both the tax preparer and veterinary consultant ranked very high, with a score of 4.36 on a five-point scale. The accountant or financial advisor also has a high importance ranking. The remaining highly-used professional services, particularly those that are more commonly used, were generally given a high importance score.

Table 5.10. Professional services used during the past two years as a source of information and usefulness ratings - Dairy farms by herd size.

Source	Herd Size (Cows Milked)				Total
	30 - 49	50 - 99	100 - 199	More than 200	
	Percent using				
Accountant or financial advisor	31.3	49.1	63.8	80.0	49.0
Farm records association agent	12.2	15.1	22.9	33.3	16.4
Tax preparer	83.5	81.2	84.8	53.3	81.6
Livestock management advisor	16.8	24.9	26.0	40.0	23.9
Crop/pest management consultant	30.7	43.1	39.0	66.7	40.5
Computer software vendor/advisor	1.7	6.0	8.6	6.7	5.6
Computer hardware vendor/advisor	2.6	3.3	4.8	13.3	3.7
Farm management consultant	11.4	13.5	15.4	13.3	13.4
Coop. Extension - county agent	51.3	50.3	62.9	53.3	52.9
Coop. Extension - specialist	22.8	26.7	36.2	40.0	28.0
University professor	5.3	10.5	19.0	26.7	11.4
Vocational agriculture teacher	9.6	12.6	6.7	6.7	10.7
Veterinary consultant	70.4	78.5	82.9	80.0	77.7
	Importance score *				
Accountant or financial advisor	4.18	4.16	4.27	4.42	4.20
Farm records association agent	3.93	3.98	4.33	4.00	4.07
Tax preparer	4.28	4.35	4.47	4.50	4.36
Livestock management advisor	3.94	4.11	4.07	4.50	4.10
Crop/pest management consultant	3.91	3.93	4.05	4.20	3.96
Computer software vendor/advisor	3.50	3.47	3.78	3.00	3.55
Computer hardware vendor/advisor	3.67	3.55	3.60	4.00	3.62
Farm management consultant	4.08	3.91	3.81	4.00	3.92
Coop. Extension - county agent	3.50	3.53	3.80	3.75	3.59
Coop. Extension - specialist	3.81	3.73	4.24	4.17	3.88
University professor	4.00	3.57	4.05	3.75	3.77
Vocational agriculture teacher	3.18	3.80	4.14	3.00	3.71
Veterinary consultant	4.38	4.33	4.43	4.33	4.36

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Importance score ranged from 1 (low) to 5 (high).

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Chapter 6

Records Systems for Beef Farmers/Ranchers.

David L. Watt, Lawrence A. Lippke, and Odell L. Walker

Beef enterprises are commonplace on farms in all regions of the United States. Beef is a good supplementary enterprise. Beef cow-calf or stocker enterprises may be included on the farm to utilize, as pasture, land not suitable for crops. Beef finishing activities may be included to use slack labor resources during off-peak labor months.

For this summary, beef farms are separated into cow-calf and stocker/finisher operations because of the differences between these operations and their differing information system needs. For the 13 state region studied, 6.5 percent of all farms were classified as cow-calf operations and 4.2 percent as stocker/finisher operations (Table 1.3). Iowa, North Dakota, Oklahoma, Oregon and Texas had the largest percentage of farms classified as beef cow-calf farms. Beef stocker/finisher enterprises were most prominent in Illinois, Oklahoma, and Texas.

The cow-calf operations averaged 160 beef cows per farm. They also reported average total acreage of 2,520, with 725 acres of field crops. They averaged $174,000 in gross sales, and $27,636 net income. The stocker/finisher operations were smaller in total acres (1,499) and slightly larger in crop acres (867). Stocker/finishers owned an average of 240 stockers and 269 head of finishers. Gross sales for the stocker/finishers averaged $311,000 with a net farm income average of $53,786. The stocker/finishers had the highest reported net farm income of any farm type in the study (Table 1.4).

In examining the size of cow-calf operations, more than half those reporting had less than 100 cows in the herd (52%). The stocker/finisher operations were fairly evenly distributed over the three size categories (Table 6.1). The stocker/finisher operators were generally younger than the cow-calf operators. About 34 percent of cow-calf operators were over 60 years of age, while only 19 percent of the stocker operators were 60 or older.

Table 6.1. Beef farms distributed by state, operator age and farm size.

	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
State	Number of farms							
Illinois	5	0	0	5	3	4	4	11
Indiana	4	0	1	5	2	0	3	5
Iowa	14	3	0	17	4	3	0	7
Michigan	2	1	0	3	2	3	0	5
Minnesota	2	0	0	2	4	2	1	7
New York	0	1	0	1	0	0	0	0
North Carolina	1	2	0	3	0	0	0	0
North Dakota	17	10	2	29	1	0	0	1
Ohio	0	0	0	0	5	2	0	7
Oklahoma	18	10	10	38	5	11	19	35
Oregon	3	3	9	15	0	0	1	1
Texas	12	8	11	31	0	5	9	14
Wisconsin	1	1	0	2	1	0	1	2
Total	79	39	33	151	27	30	38	95
Age of operator								
Less than 30	1	0	1	2	1	2	1	4
30 - 39	13	8	3	24	5	5	9	19
40 - 49	19	6	8	33	8	6	13	27
50 - 59	18	8	8	34	7	9	8	24
60 - 69	20	15	7	42	4	6	4	14
70 and over	2	2	2	6	1	1	1	3

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Accounting Information Systems

The adoption of financial records in beef operations roughly approximates that for all surveyed farms. However, stocker operators relied least on internal financial records (46%) and most on a combination of internal and external components (37%) (Table 6.2). They also reported the least incidence of manual records systems (54%) and the highest use of computerized records systems (22%). Cow-calf operators had the smallest percent (9.5) reporting a computer-based financial records system. They also had the highest percentage (20.4) using a combination of computer- and manual-based systems. Along with this, stocker operators reported the highest use of double-entry accounting systems (41%) and the highest use of accounting packages designed for farm firms (64%). Responsibility for keeping financial records rests with the operator or spouse on 96 percent of the cow-calf operations and 92 percent of the stocker/finisher operations.

Cow-calf producers were least likely to use an external records service as the sole means of recordkeeping, but conversely, were most likely to use only internal financial records. Likewise, cow-calf producers were least apt to use only a computerized records system, but most likely to use a combination of manual and computerized systems.

Table 6.2. Description of farmers' financial records systems - Beef farms by enterprise size.

Measure	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
	Percent							
Record-keeping method:								
Use external records service only	2.5	.0	9.1	3.3	3.7	13.3	10.5	9.5
Keep internal financial records only	60.8	74.4	51.5	62.3	63.0	46.7	39.5	48.4
Have both internal and external components	24.1	17.9	33.3	24.5	29.6	30.0	44.7	35.8
Keep no financial records	12.7	7.7	6.1	9.9	3.7	10.0	5.3	6.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Media used for internal farm financial records:								
Manual records system	66.7	74.3	75.0	70.5	62.5	73.9	43.8	58.2
Computer-based records system	9.1	17.1	3.6	10.1	29.2	8.7	25.0	21.5
Both manual and computer-based components	21.2	8.6	21.4	17.8	4.2	4.3	31.3	15.2
Mail-in records system	3.0	.0	.0	1.6	4.2	13.0	.0	5.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Accounting method employed:								
Single-entry accounting	63.2	62.5	76.9	66.1	68.2	73.7	46.7	60.6
Double-entry accounting	36.8	37.5	23.1	33.9	31.8	26.3	53.3	39.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Type of computer-based financial records:								
General business accounting software	10.0	55.6	40.0	26.5	.0	.0	7.7	3.7
Accounting package designed for farm firms	55.0	22.2	.0	38.2	75.0	16.7	69.2	59.3
Accounts maintained using an electronic spreadsheet	5.0	.0	40.0	8.8	12.5	16.7	.0	7.4
Accounts maintained using database management software	20.0	11.1	20.0	17.6	.0	16.7	7.7	7.4
Mail-in records system	10.0	11.1	.0	8.8	12.5	50.0	7.7	18.5
Other	.0	.0	.0	.0	.0	.0	7.7	3.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Person primarily responsible for keeping financial records:								
Operator	57.6	50.0	60.7	56.2	50.0	73.9	66.7	63.6
Partner in the farming business	1.5	2.8	10.7	3.8	8.3	4.3	6.7	6.5
Spouse or other family member	39.4	44.4	28.6	38.5	41.7	21.7	26.7	29.9
Hired employee	1.5	2.8	.0	1.5	.0	.0	.0	.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Hours per month spent keeping and analyzing farm records:								
Less than 10 hours/month	82.9	75.8	58.6	75.8	77.8	71.4	63.6	70.5
10 - 24 hours/month	14.3	21.2	27.6	18.9	18.5	25.0	30.3	25.0
25 - 49 hours/month	1.4	3.0	6.9	3.0	3.7	3.6	3.0	3.4
More than 50 hours/month	1.4	.0	6.9	2.3	.0	.0	3.0	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Smaller operations were twice as likely not to keep financial records as were the larger (over 200 cows) operations (Table 6.2). However, of those keeping financial records, more of the smaller operations used double entry accounting than did the larger operations (37 percent and 23 percent, respectively).

As opposed to the cow-calf operations, the stocker operations were more evenly distributed among the size classes, with somewhat more falling in the larger size category of over 500 head. There was a direct relationship between size of operation and use of both internal and external records. Over half (53%) of larger stocker operators used double-entry accounting for their financial records, while less than a third of the smaller operators used such a method (Table 6.2). Larger stocker/finisher operators used accountants or financial advisors much more than small operators (64 percent vs 37 percent), and also were more likely to use livestock management advisors (Table 6.2).

Production Records

Production records are the primary focus of recordkeeping among the beef farms, with less than half keeping price records (Table 6.3). Stocker/finisher operators reported the highest use of futures market prices among all the commodity groups analyzed, with 27 percent keeping such records.

Table 6.3. Livestock enterprise records systems -- Beef farms by enterprise size.

Method or measure	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
	Percent							
Methods used for livestock records:								
A manual system on paper	82.1	81.3	84.0	82.3				
A computer program I designed	4.5	9.4	16.0	8.1				
A computer program I purchased	3.0	3.1	4.0	3.2				
A service bureau (e.g., DHIA)	1.5	6.3	.0	2.4				
Information recorded for beef farms								
Animal health records	34.9	44.8	37.5	37.9				
A schedule of when pregnant animals are due.	66.7	65.5	70.8	67.2				
Sires of pregnant animals	50.8	65.5	41.7	52.6				
Number of offspring	73.0	75.9	70.8	73.3				
Weights of offspring	25.4	37.9	45.8	32.8				
Birthdates of offspring	54.0	65.5	54.2	56.9				
Sire and dam of offspring	33.3	58.6	37.5	40.5				
Do you keep records of feed fed to animals?								
No	56.2	29.0	34.4	44.9	30.8	33.3	23.7	28.6
Yes - on a total farm basis only	28.8	51.6	46.9	38.2	53.8	51.9	47.4	50.5
Yes - on a species basis only	8.2	3.2	.0	5.1	.0	3.7	2.6	2.2
Yes - on a group level within species	4.1	16.1	15.6	9.6	15.4	11.1	26.3	18.7
Yes - on an individual animal basis	2.7	.0	3.1	2.2	.0	.0	.0	.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Method used for feeding records.								
Paper system	92.3	87.5	83.3	88.3	81.8	100.0	78.6	84.9
Self-designed computer system	7.7	6.3	.0	5.0	9.1	.0	7.1	5.7
Purchased computer feed records	.0	.0	.0	.0	.0	.0	10.7	5.7
Other	.0	6.3	16.7	6.7	9.1	.0	3.6	3.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Stocker/finisher operators were the most likely to keep records of feed fed to animals, with only 27 percent not keeping such records. More than half the stocker/finisher operators keep feed records on a total farm basis only. Because date of calving is not critical to facility use or labor needs decisions, fewer of the cow-calf operators kept records on when pregnant animals are due (65%) than did dairy (95%) or farrowing operations (94%). However, more of them kept weight of offspring (31%) and number of offspring (79%) records than did dairy and farrowing operators. Because it is much less a critical success factor than for other operations, only 54 percent of the cow-calf operators kept records of feed fed to animals. Stocker/finishers reported keeping feed records at the total farm basis at a rate of 52 percent, the highest of any of the livestock categories. Of those keeping records on feed fed to animals, close to 90 percent of both categories of beef

operations used a paper system for feed records. Compared to dairy and hog farrowing, cow-calf operators reported significantly lower adoption of records about when pregnant animals are due (65%), but exceeded the other breeding groups in records of the number and weights of offspring (78 percent and 31 percent, respectively). They were least likely to keep feed records (54%).

Analysis of livestock enterprise systems indicates few differences across the various sizes. Although more than 80 percent of the cow-calf operators reported using manual records systems, this characteristic appeared not to be influenced by size of herd (Table 6.3). However, the larger cow-calf herd sizes reported a higher adoption of self-designed computer programs in addition on manual records. Compared to the intermediate size of 100-199 cow-calf herds, large herd operators did not keep records of sires of pregnant animals nearly as frequently (42 percent vs 66 percent). There was a clear relationship between herd size and keeping records of offspring weights, from 25 percent for small herds, to 46 percent for large herds. Intermediate herd operators reported a much higher percent of sire/dam records (59%) than either of the other two sizes, both of which had less than 38 percent adoption. Finally, over half the small herd operators kept no records of feed fed to animals (Table 6.3).

Crop enterprise recordkeeping, in several instances was less common for larger beef operations, particularly on records of yields, crop moisture, and costs of production and revenue (Table 6.4). This may indicate that time limitations are a factor, and that less time consuming record-keeping systems may be needed to increase adoption.

Table 6.4. Crop enterprise records systems - Beef farms by enterprise size.

	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
Measure	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
	Percent							
Crop records system components:								
Notes on calendars	41.3	38.9	38.7	40.1	33.3	48.1	32.4	37.4
Pocket notebook	64.0	61.1	45.2	59.2	59.3	70.4	64.9	64.8
Field record book	37.3	44.4	35.5	38.7	48.1	40.7	51.4	47.3
Computerized crop records program	10.7	2.8	.0	6.3	.0	.0	8.1	3.3
Computer data base of own design	9.3	5.6	9.7	8.5	7.4	7.4	8.1	7.7
Crop information kept in the crop records								
Fertilizer used	80.3	81.8	64.3	77.4	96.3	96.3	91.9	94.5
Manure applied	15.8	15.2	10.7	14.6	40.7	22.2	16.2	25.3
Herbicides applied	69.7	66.7	42.9	63.5	85.2	85.2	75.7	81.3
Insecticides or fungicide applied	64.5	54.5	25.0	54.0	77.8	66.7	64.9	69.2
Machinery operations performed	34.2	45.5	25.0	35.0	48.1	51.9	54.1	51.6
Yield	75.0	69.7	57.1	70.1	81.5	85.2	78.4	81.3
Moisture of crops	25.0	15.2	17.9	21.2	40.7	25.9	21.6	28.6
Costs of production and revenue	59.2	54.5	42.9	54.7	81.5	70.4	67.6	72.5
Irrigation scheduling/amounts	12.2	15.2	21.4	14.8	3.7	7.4	5.6	5.6
Percent keeping records (or charts) of commodity price								
Local cash prices	26.9	16.7	23.5	23.7	50.0	18.2	35.5	34.7
Futures market prices	13.4	10.0	23.5	14.0	13.6	22.7	38.7	26.7
Forward contract bids	3.0	3.3	5.9	3.5	18.2	9.1	9.7	12.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Importance of Farm Records

The most important uses of farm records on cow-calf herds were for the decision of which animals to cull, for tax planning, and for evaluating the profitability of the herd (Table 6.5). By contrast, the only use rated highly by stocker/finishers was profitability evaluation. Relative to the other breeding enterprises included in the survey (dairy and hog farrowing), cow-calf producers found records less important for determining feed rations and when to breed animals, but reported records to be more important for decisions about expanding or contracting herd size. Cow-calf producers also indicated that records to decide when to trade equipment or about home vs. business use of finances were deemed less important than that reported by any of the other commodity producers.

Table 6.5. Importance of farm records system for making farm decisions - Beef farms by enterprise size. *

	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
Decision	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
Crop decisions								
Fertilization amount	3.57	3.35	3.24	3.46	3.69	4.00	3.70	3.79
Pesticide amount and timing	3.27	3.24	2.69	3.17	3.04	3.44	3.27	3.25
Crop variety	3.62	3.36	2.94	3.45	4.08	3.68	4.00	3.92
Tillage system	3.05	3.12	2.60	2.99	3.35	3.25	3.21	3.27
What crops to plant by field	3.49	3.66	2.75	3.41	3.29	3.40	3.24	3.31
Evaluating crop insurance	2.41	2.69	2.13	2.43	2.67	2.58	2.41	2.55
How and when to market	3.49	3.20	2.81	3.31	3.65	3.29	3.27	3.39
Evaluating govt. programs	3.36	3.17	2.56	3.18	3.46	3.29	3.21	3.32
Determining land rental rates	2.85	2.98	2.54	2.83	2.96	2.61	2.57	2.70
Irrigation scheduling	2.44	2.50	3.40	2.61	2.00	2.50	1.60	2.00
Livestock decision								
Most economical feed ration	3.14	3.26	3.30	3.21	3.22	3.70	3.58	3.52
Health program/disease prevention	3.61	3.72	3.30	3.58	3.00	3.93	3.91	3.67
What animals to cull	4.14	3.94	3.78	4.02	2.67	2.83	3.11	2.89
What sires to use	3.90	3.84	3.43	3.79	2.28	2.32	2.54	2.39
When to breed animals	3.69	3.48	3.23	3.54	2.39	2.21	1.92	2.15
Producing vs. purchasing feed/hay	3.11	3.33	3.22	3.19	2.83	3.17	3.37	3.16
Grazing intensity - stocking rate	3.18	3.10	3.39	3.21	2.53	2.91	3.00	2.86
When to expand/contract herd size	3.00	2.96	2.95	2.98	2.47	2.59	2.77	2.63
When to market animals/products	3.53	3.43	3.23	3.44	3.58	3.18	3.75	3.53
How/where to market animals/products	3.38	3.57	3.09	3.37	3.48	3.09	3.65	3.43
Investment decisions								
When to trade equipment	2.86	2.67	2.79	2.80	2.71	2.93	3.12	2.95
When to build/expand buildings	2.48	2.52	2.36	2.47	3.05	2.72	2.59	2.75
Evaluating lease/purchase of land	3.04	3.07	2.95	3.03	3.05	3.23	3.13	3.14
Evaluating lease/purchase of machinery	2.77	2.65	2.21	2.63	2.52	3.04	3.03	2.90
Borrowing money	3.49	3.67	3.45	3.53	3.76	3.89	3.82	3.83
Tax planning	4.11	4.23	3.96	4.11	4.32	4.00	4.00	4.08
Evaluating profitability of the farm	4.14	4.14	4.12	4.13	4.13	4.27	4.35	4.27
Home vs. business use of finances	3.13	2.96	2.59	2.97	3.30	3.72	3.07	3.35

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Importance score ranged from 1 (low) to 5 (high).

One would expect that larger farms would find records systems to be of greater importance than smaller farms. However, when asked the importance of farm records systems for making farm decisions (Table 6.5), the cow-calf producers reported levels of importance that appear to be negatively correlated to size of farm or constant across size.

Two exceptions were for irrigation scheduling and most economical feed ration. Among the stocker/finishers the expected positive correlation appears to occur in livestock decisions, but many of the crop decisions seem to have an inverse relationship to enterprise size.

It seems that larger farms consider their records systems to be of greater importance than do smaller farms. When asked the importance of farm records systems for making farm decisions (Table 6.5), the cow-calf producers reported levels of importance that appear to be either negatively correlated to size of farm or constant across farm size. Two exceptions were for irrigation scheduling and economical feed ration. Among the stocker/finishers the expected positive correlation appears to occur in livestock decisions, but many crop decisions seem to have a negative relationship to enterprise size.

Computer Adoption

As is characteristic of the total weighted sample, the percentage of time that the farm computer is used for various software applications is concentrated in business accounting, spreadsheets, and word processing -- the only applications receiving more than 10 percent of the total time the farm computer is used (Table 6.6). Cow-calf operators used database management software more than any of the farm types included in the study. However, stocker operators spent the lowest percentage of time using electronic spreadsheets, using it only 9 percent of the time for this purpose compared with 24 percent for the hog finisher.

Table 6.6. Percentage of farmers adopting computers and their evaluation of its usefulness for management - Beef farms by enterprise size.

	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
Measure	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
Computer adoption percent.....	26.6	25.6	21.2	25.2	33.3	16.7	36.8	29.5
Computer usefulness score *.....	3.7	4.0	3.3	3.7	4.3	3.8	4.4	4.3
Hours of computer use per month @.....	11.0	7.4	21.9	12.1	12.8	11.5	27.5	19.9
Months before computer is useful #.....	4.1	7.4	6.4	5.6	9.0	7.0	4.3	6.5

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Hours of use of computer for farm management tasks.
# Months from computer purchase until the computer was felt to be useful as a management tool.

Over a third of the small and large stocker/finisher operators had adopted computers in their operations, but only 17 percent of the intermediate-sized operators had adopted computers (Table 6.6). Small operators tended to use computers for tax computation and access to electronic information services much more so than did the intermediate and large operators. Large operators, however, reported a greater incidence of using computers for herd production recordkeeping. The use of data base management software appears to be

inversely related to herd size, while the use of livestock record-keeping software is directly related to herd size. Computer adoption rates appear to be inversely related to cow-calf herd size, with almost 27 percent of the small herd operators using computers while only 21 percent of the large operators use them (Table 6.6). And larger herd owners report longer amounts of time before computer is useful. Among the stocker/finisher operators larger enterprise reduced the months before the computer is useful from 9 to 4.3 and increases hours of computer use per month from 13 to 28.

The small and intermediate cow-calf operators used the computer most for tax computation, business planning, and crop production, the large operators used computers extensively for business correspondence, herd production, and marketing/price analysis (Table 6.7). More than two-thirds of the small cow-calf operators having computers reported using them for four different tasks; business financial accounting, business planning, tax computation, and crop production recordkeeping. The large cow-calf operators reported the same level of use of computers for the three tasks of business financial accounting, business correspondence and herd production recordkeeping. Among the small stocker/finisher operators, two-thirds indicated using their computers for business financial accounting, business planning, tax computation, and business correspondence. Among the large operators, business financial accounting and business planning were the only two used at this level. Not surprisingly, individuals using the computer for specific tasks generally found the computer to be quite helpful.

Table 6.7. Management tasks for which the computer is used and its helpfulness rating - Beef farms by enterprise size.

Task	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
	Percent using							
Business financial accounting	88.9	90.0	85.7	88.6	100.0	75.0	100.0	95.8
Business planning	77.8	80.0	57.1	74.3	77.8	100.0	81.8	83.3
Tax computation	77.8	80.0	57.1	74.3	88.9	25.0	45.5	58.3
Business correspondence	61.1	60.0	85.7	65.7	66.7	75.0	63.6	66.7
Herd production recordkeeping	47.1	40.0	71.4	50.0	37.5	.0	45.5	34.8
Crop production recordkeeping	66.7	40.0	57.1	57.1	44.4	75.0	54.5	54.2
Marketing and price analysis	33.3	30.0	57.1	37.1	44.4	25.0	45.5	41.7
Access to an electronic information service	35.3	30.0	28.6	32.4	22.2	.0	9.1	12.5
	Helpfulness score *							
Business financial accounting	4.7	4.6	4.2	4.6	4.9	5.0	4.6	4.8
Business planning	4.0	4.4	4.5	4.2	4.4	4.3	4.7	4.5
Tax computation	4.5	4.1	3.5	4.2	4.3	5.0	4.8	4.5
Business correspondence	3.8	4.0	3.6	3.8	4.0	4.0	3.9	3.9
Herd production recordkeeping	4.7	4.3	3.8	4.3	4.7	.	3.6	4.0
Crop production recordkeeping	4.1	4.8	3.0	4.0	4.3	4.0	3.8	4.0
Marketing and price analysis	3.7	4.0	2.8	3.5	4.0	4.0	4.2	4.1
Access to an electronic information service	3.0	3.7	4.5	3.5	4.5	.	2.0	3.7

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Helpfulness scores ranged from 1 (low) to 5 (high).

The small cow-calf operators having computers reported spending over 10 percent of their time on the computer on four different types of software (business accounting, tax computation, spreadsheets, word processing) while the large operators focused on only three (business accounting, spreadsheets, and word processing)(Table 6.8). Compared to other types of farms in the survey, very few of the beef producers have adopted computer information systems, and of those, the stocker/finishers rated them as more useful (Table 6.9). This may indicate that existing computer information systems do not service important information needs for beef producers.

Table 6.8. Percentage of time that the farm computer is used for various computer software applications - Beef farms by enterprise size.

	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
Software application	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
Business accounting software package.....	32.9	53.3	43.3	42.0	55.0	50.5	39.0	46.7
Tax computation package.....	10.6	1.7	1.7	5.6	13.1	3.3	3.3	7.1
Electronic spreadsheet software.....	11.7	20.6	30.8	18.9	6.3	21.2	11.0	10.6
Word processing software.....	12.9	6.7	12.5	10.7	11.9	9.4	9.5	10.4
Data base management software.....	9.4	4.4	5.0	6.8	8.1	6.4	2.5	5.2
Market price analysis software package.....	2.9	.6	.0	1.5	1.3	.0	6.0	3.3
Crop recordkeeping software.....	7.6	5.6	.0	5.2	.0	3.6	8.3	4.5
Livestock recordkeeping software.....	3.7	6.7	6.7	5.4	.0	3.9	12.3	6.4
Other.....	8.3	.6	.0	3.9	4.4	1.7	8.0	5.7

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Table 6.9. Farmers' use of computerized information systems (CIS) - Beef farms by enterprise size.

	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
Measure	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
CIS adoption percent.....	5.13	2.56	6.06	4.67	14.81	3.33	18.92	12.77
CIS usefulness score *.....	3.60	2.00	4.00	3.50	4.25	5.00	4.38	4.38
Annual expenditure @.....	99.20	19.00	37.50	73.75	205.50	.00	211.50	193.38

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Total expenditure for all CIS sources.

Use of External Professionals

Of the list of professional services in the questionnaire, only three of the professional services were reported as a source of information by more than 50 percent of the cow-calf operators (Table 6.10). These were tax preparer, county extension agent, and veterinary consultant. Two of these, tax preparer and veterinary consultant, were ranked as being quite useful (score of four or higher). Cow-calf operators ranked only two sources of information (farm management consultant, computer software vendors) as being less useful sources of information than university professors.

Table 6.10. Professional services used as a source of information during the past two years and the usefulness of each -- Beef farms by enterprise size.

Source	Beef enterprise type							
	Cow-calf herds				Stocker - finisher			
	Enterprise Size			Total	Enterprise Size			Total
	50 - 99	100 - 199	More than 200		100 - 199	200 - 499	More than 500	
	Percent using							
Accountant or financial advisor	43.4	44.7	60.6	47.6	37.0	43.3	63.9	49.5
Farm records association agent	9.3	5.3	3.0	6.8	11.1	16.7	16.7	15.1
Tax preparer	86.8	78.9	69.7	81.0	77.8	86.7	75.0	79.6
Livestock management advisor	7.9	5.3	6.1	6.8	7.4	13.3	16.7	12.9
Crop/pest management consultant	32.0	21.1	12.1	24.7	18.5	44.8	25.0	29.3
Computer software vendor/advisor	8.0	10.8	9.1	9.0	7.4	6.7	13.9	9.7
Computer hardware vendor/advisor	10.7	13.2	6.1	10.3	3.7	3.3	5.6	4.3
Farm management consultant	2.7	2.6	3.0	2.7	11.1	6.7	8.3	8.6
Coop. Extension - county agent	60.5	60.5	51.5	58.5	48.1	63.3	55.6	55.9
Coop. Extension - specialist	26.3	34.2	24.2	27.9	22.2	43.3	38.9	35.5
University professor	14.7	13.2	12.1	13.7	14.8	10.0	11.1	11.8
Vocational agriculture teacher	12.0	10.5	12.1	11.6	11.1	6.7	8.3	8.6
Veterinary consultant	69.7	68.4	69.7	69.4	55.6	86.7	86.1	77.4
	Importance score *							
Accountant or financial advisor	4.44	4.00	3.95	4.17	3.90	4.38	4.45	4.31
Farm records association agent	3.71	5.00	5.00	4.00	3.33	4.00	4.83	4.21
Tax preparer	4.42	4.19	4.25	4.33	4.15	4.54	4.62	4.46
Livestock management advisor	3.83	4.00	4.50	4.00	4.00	4.75	4.00	4.27
Crop/pest management consultant	4.05	4.13	3.33	4.00	4.20	4.25	4.44	4.31
Computer software vendor/advisor	4.00	3.50	2.33	3.46	4.00	5.00	4.00	4.25
Computer hardware vendor/advisor	3.75	3.75	5.00	3.85	5.00	5.00	5.00	5.00
Farm management consultant	3.00	.	.	3.00	4.00	3.00	3.33	3.50
Coop. Extension - county agent	3.86	3.79	3.44	3.75	3.31	3.72	3.68	3.60
Coop. Extension - specialist	4.00	3.75	4.14	3.95	4.00	4.00	4.23	4.10
University professor	3.67	3.75	3.75	3.71	4.75	4.33	3.25	4.09
Vocational agriculture teacher	3.78	3.00	3.75	3.63	4.67	2.50	2.00	3.13
Veterinary consultant	4.21	4.13	4.00	4.14	4.36	4.32	4.27	4.30

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).

In use of professional services, large herd operators used accountants or financial advisors much more than did the small and intermediate operators. In addition, over half the operators in all sizes of both categories used the professional services of tax preparer, coop extension - county agent and veterinary consultant. Surprisingly, there is very little difference across size of enterprise with respect to the percentage of operators using the various professional services other than the use of accountants or financial advisors mentioned above.

Chapter 7

Use of Farm Information Systems by Pork Producers

Robert W. Jolly and Robert H. Hornbaker

The pork industry in the United States is undergoing a rapid and profound transformation. Smaller, family-operated integrated pork and crop production farms in the Midwest are being supplanted by much larger, more specialized pork operations. The new entrants, in most cases, are vertically integrated or coordinated in one or more phases of pork production. Crop production is rarely included in the enterprise mix with the exception of meeting waste management requirements and other environmental regulations. Because of the market or contractual coordination within the restructured pork industry, information flows will also change rather significantly. Information on performance-related factors and their impact on costs, returns or product characteristics will likely be communicated up and down market channels with much greater speed and accuracy than was possible using decentralized markets.

As the restructuring of the pork industry continues, we expect to see intense competition between the new corporate entrants, and existing production units. Access to and control of information will play as important a role in the restructuring process as access to technology, genetics or meat processors. In this report we examine the current state of information use among a sample of pork producers in the United States. With this survey as a benchmark, some insight is gained into the future information needs of the pork industry, as well as the likely role information will play in the industry's transformation.

Historically, pork producers have tended to specialize in one phase of the production cycle. Farrow-to-finish producers maintain breeding herds and feed pigs to market weight. Feeder pig producers also maintain breeding herds but sell pigs for other operations to finish. Feeder pig finishers buy feeder pigs and feed them to market weight. It is common, however, to find producers occasionally engaged in more than one phase of production. Farrow-to-finish operators may sell feeder pigs if market conditions are favorable. Or they may purchase feeder pigs if they have excess finishing space. Recently, we have also seen the emergence of new production phases such as specialized nurseries. Using advances in immune system management, specialized nurseries take in multisource pigs weaned at 2-3 weeks and resell them as single-source feeders at 5-6 weeks. The new nursery enterprises allow separation (geographic and ownership) of the farrowing and finishing production phases in a way that permits large scale finishing.

In this chapter, we distinguish only two types or phases of production -- farrowing and finishing. The farrowing operations are those that manage a sow herd and sell either feeder or market weight pigs. The finishing enterprises primarily include feeder pig finishing operations although farrowing enterprises could also be included. Specialized

nursery enterprises are relatively few, but could be classified with either group.

Farm Characteristics

The population of commercial farmers in the 13 state region tends to be dominated by crop and dairy producers (see Table 1.3). Hog farrowing and finishing enterprises, respectively, make up 9.3 and 5.6 percent of the commercial farms in the region. Pork producers operated fewer acres than more specialized crop farms. Farrowing operations managed more crop acres than finishers. Finishers tended to have more beef-related enterprises than farrowers. Some farrowing is reported by finishers and vice versa. This indicates that combined production phases occurs in some operations. Net income for farrowers was higher than for finishers. In fact, hog finishers had the lowest incomes among all enterprise types.

Table 7.1 reports numbers of hog farrowing and finishing farms across several size and operator age categories for states participating in the survey. Iowa, Illinois, Indiana, Minnesota and Ohio account for most of the hog operations in the sample. The majority tend to be smaller operations -- less than 200 sows or finishing fewer than 1,000 head per year. Age distributions are generally consistent with census data.

Table 7.1. Hog farms distributed by state, operator age and farm size.

	Hog enterprise type							
	Farrowing				Finishing			
	Litters Farrowed			Total	Hogs Marketed			Total
	100 - 199	200 - 499	More than 500		200 - 499	500 - 999	More than 1,000	
State	Number							
Illinois	12	9	2	23	5	3	2	10
Indiana	15	7	4	26	3	5	4	12
Iowa	31	17	3	51	16	18	7	41
Michigan	3	1	2	6	2	2	1	5
Minnesota	12	15	0	27	6	4	6	16
New York	0	1	0	1	0	1	0	1
North Carolina	0	1	1	2	0	0	4	4
North Dakota	1	0	0	1	2	0	0	2
Ohio	9	4	3	16	7	2	6	15
Wisconsin	5	0	1	6	1	1	0	2
Total	88	55	16	159	42	36	30	108
Age of operator								
Less than 30	2	2	1	5	1	1	1	3
30 - 39	24	10	3	37	13	9	8	30
40 - 49	22	17	6	45	16	10	10	36
50 - 59	23	21	4	48	8	6	5	19
60 - 69	11	3	1	15	4	8	6	18
70 and over	2	0	1	3	0	0	0	0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Financial Records

The financial record-keeping method used by pork producers did not vary greatly from other farm types. Approximately 60 percent kept only internal financial records. Farrowing enterprises were somewhat more likely to use external services than were finishers. Virtually all (99.5%) of farrowing operations maintained financial records, compared with 93.4 percent for finishers.

Hand-kept financial records systems were common -- 63.3 percent for farrowing operations and 72 percent for finishers. Reliance on manual systems was common to all enterprise types, however. Farrowing operations were more likely to use computer-based records systems than the overall sample average. Consistent with hand-kept records, most accounting was performed using single-entry methods. Farrowing enterprises were more likely than finishers to use double-entry methods, 37.4 percent, compared with 26.6 percent. Hog finishers showed a greater reliance on commercial and farm general accounting software packages than did farrowing operations. The farrowers used more data base management software and mail-in records programs. Virtually all financial recordkeeping and analysis was performed either by the operator or the spouse in both types of swine enterprises. Again, this relationship was observed across all farm types. Approximately three-fourths of the pork producers spent less than 10 hours per month keeping financial records. Finishers tend to spend slightly less time keeping and analyzing farm financial records than do farrowing operations.

Larger hog farrowing farms used approximately the same mix of financial record-keeping methods as the sample average (Table 7.2). Larger hog finishing operations appeared to favor external record-keeping methods in combination with internal recordkeeping. For both farm types, the use of computer-based systems for internal recordkeeping increased with farm size.

Double-entry accounting systems were preferred by larger hog producers. Computer-based records systems rely either on general business or specialized farm accounting systems. Larger hog farrowing operations were more likely to use general business software, however. Larger farrowing farms were also more likely to use hired labor for recordkeeping in exchange for operator or spouse labor. The feeder pig finishers did not exhibit any consistent size trends in either software use or recordkeeping. However, the total time pork producers spent keeping and analyzing farm records increased with farm size.

Table 7.2. Description of farmers' financial records systems - Hog farms by enterprise size.

Measure	Hog enterprise type							
	Farrowing				Finishing			
	Litters Farrowed			Total	Hogs Marketed			Total
	100 - 199	200 - 499	More than 500		200 - 499	500 - 999	More than 1,000	
	Percent							
Record-keeping method:								
Use external records service only	8.0	16.7	12.5	11.4	7.1	.0	13.8	6.6
Keep internal financial records only	65.9	40.7	62.5	57.0	69.0	71.4	31.0	59.4
Have both internal and external components	25.0	42.6	25.0	31.0	19.0	20.0	48.3	27.4
Keep no financial records	1.1	.0	.0	.6	4.8	8.6	6.9	6.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Media used for internal farm financial records:								
Manual records system	72.7	47.7	57.1	63.0	80.6	68.8	69.6	73.6
Computer-based records system	15.6	22.7	28.6	19.3	2.8	15.6	21.7	12.1
Both manual and computer-based components	9.1	25.0	14.3	14.8	16.7	15.6	8.7	14.3
Mail-in records system	2.6	4.5	.0	3.0	.0	.0	.0	.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Accounting method employed:								
Single-entry accounting	68.1	50.0	22.2	58.6	75.0	74.2	65.2	72.1
Double-entry accounting	31.9	50.0	77.8	41.4	25.0	25.8	34.8	27.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Type of computer-based financial records:								
General business accounting software	10.0	10.0	40.0	13.3	25.0	28.6	12.5	21.7
Accounting package designed for farm firms	50.0	60.0	40.0	53.3	25.0	57.1	87.5	56.5
Accounts maintained using an electronic spreadsheet	10.0	.0	.0	4.4	25.0	14.3	.0	13.0
Accounts maintained using database management software	5.0	10.0	.0	6.7	.0	.0	.0	.0
Mail-in records system	15.0	15.0	20.0	15.6	12.5	.0	.0	4.3
Other	10.0	5.0	.0	6.7	12.5	.0	.0	4.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Person primarily responsible for keeping financial records:								
Operator	63.6	64.4	42.9	61.8	75.0	75.0	73.9	74.7
Partner in the farming business	.0	.0	7.1	.7	.0	.0	4.3	1.1
Spouse or other family member	36.4	35.6	28.6	35.3	25.0	25.0	21.7	24.2
Hired employee	.0	.0	21.4	2.2	.0	.0	.0	.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Hours per month spent keeping and analyzing farm records:								
Less than 10 hours/month	75.3	73.1	40.0	70.9	75.6	80.6	65.5	74.3
10 - 24 hours/month	17.3	21.2	46.7	21.6	19.5	19.4	27.6	21.8
25 - 49 hours/month	6.2	5.8	.0	5.4	4.9	.0	6.9	4.0
More than 50 hours/month	1.2	.0	13.3	2.0	.0	.0	.0	.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Livestock Records

As expected, farrowing enterprises were much more likely to keep breeding records than were finishers. This reflects the relative specialization of the two farm types. Farrowers were slightly more likely to use paper manual systems than were dairy producers and much less likely to use a service bureau.

Compared with dairy enterprises, farrowing operations tended to record information related to time of birth, rather than breeding information on sires and dams or health information. This would suggest farrowers have a relatively greater interest in facility utilization than in breeding and genetics as compared with dairy producers.

Approximately 70 percent of all farrowing and finishing operations reported keeping feed records. Most, however, maintain feed records on a farm basis. The next most common type of feed records was on a group basis within species. With the move to all-in

all-out production, this would be expected.

Livestock records systems were more likely to be computerized in larger farrowing operations (Table 7.3). Maintenance of feed records increased sharply with enterprise size -- particularly recordkeeping on a group level. Although paper-based feed recording systems were the most common, larger pork producers were more likely to use a purchased computerized feed recording system.

Table 7.3. Livestock enterprise records systems -- Hog farms by enterprise size.

Method or measure	Hog enterprise type							
	Farrowing				Finishing			
	Litters Farrowed			Total	Hogs Marketed			Total
	100 - 199	200 - 499	More than 500		200 - 499	500 - 999	More than 1,000	
	Percent							
Methods used for livestock records								
A manual system on paper	91.8	87.0	64.3	87.2				
A computer program I designed	4.1	2.2	.0	3.0				
A computer program I purchased	5.5	13.0	35.7	11.3				
A service bureau (e.g., DHIA)	4.1	6.5	14.3	6.0				
Information recorded for hog farms								
Animal health records	35.2	28.9	42.9	33.8				
A schedule of when pregnant animals are due.	93.0	97.8	100.0	95.4				
Sires of pregnant animals	39.4	46.7	64.3	44.6				
Number of offspring	69.0	68.9	57.1	67.7				
Weights of offspring	16.9	31.1	35.7	23.8				
Birthdates of offspring	62.0	57.8	71.4	61.5				
Sire and dam of offspring	22.5	31.1	35.7	26.9				
Do you keep records of feed fed to animals?								
No	28.8	25.9	26.7	27.5	39.0	31.4	21.4	31.7
Yes - on a total farm basis only	48.8	38.9	26.7	43.0	29.3	40.0	39.3	35.6
Yes - on a species basis only	13.8	9.3	6.7	11.4	14.6	14.3	3.6	11.5
Yes - on a group level within species	8.8	24.1	40.0	17.4	14.6	14.3	35.7	20.2
Yes - on an individual animal basis	.0	1.9	.0	.7	2.4	.0	.0	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Method used for feeding records.								
Paper system	87.0	67.6	62.5	78.1	90.5	65.2	66.7	74.2
Self-designed computer system	3.7	2.9	.0	3.1	4.8	21.7	5.6	11.3
Purchased computer feed records	7.4	29.4	37.5	17.7	4.8	4.3	22.2	9.7
Other	1.9	.0	.0	1.0	.0	8.7	5.6	4.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Crop Records Systems

Most crop production data were recorded manually for hog farrowing and finishing enterprises. Pocket notebooks were the preferred method, with field record books and calendars a distant second and third. As one might expect, pork producers and field crop producers differed little in the crop records system component.

The type of crop-related information kept did not differ greatly between farrowers and finishers. Pork producers were more likely to keep information on manure application than field or specialty crop producers. However, they were less likely to maintain these records than were dairy producers.

Farrowing operations were less likely to maintain crop price records than were field or specialty crop producers. Less than a third of all farrowing enterprises reported keeping local cash crop price information compared with 37 percent for the hog finishers and nearly half for the field crop operations.

Crop enterprise records systems for pork producers showed almost no influence of hog enterprise size (Table 7.4). This included the system components, information recorded and the applications.

Table 7.4. Crop enterprise records systems - Hog farms by enterprise size.

Measure	Hog enterprise type							
	Farrowing				Finishing			
	Litters Farrowed			Total	Hogs Marketed			Total
	100 - 199	200 - 499	More than 500		200 - 499	500 - 999	More than 1,000	
	Percent							
Crop records system components								
Notes on calendars	34.5	28.6	23.1	31.5	43.9	28.6	37.9	37.1
Pocket notebook	73.6	73.5	76.9	73.8	78.0	74.3	75.9	76.2
Field record book	39.1	55.1	46.2	45.0	39.0	42.9	48.3	42.9
Computerized crop records program	1.1	6.1	7.7	3.4	2.4	5.7	10.3	5.7
Computer data base of own design	4.6	6.1	7.7	5.4	4.9	14.3	10.3	9.5
Crop information kept in the crop records								
Fertilizer used	81.6	86.5	100.0	84.9	85.7	88.2	93.1	88.6
Manure applied	40.2	32.7	30.8	36.8	38.1	26.5	48.3	37.1
Herbicides applied	81.6	86.5	92.3	84.2	83.3	88.2	96.6	88.6
Insecticides or fungicide applied	65.1	63.5	76.9	65.6	63.4	54.5	86.2	67.0
Machinery operations performed	35.6	38.5	23.1	35.5	31.0	29.4	51.7	36.2
Yield	79.3	80.8	84.6	80.3	81.0	82.4	82.8	81.9
Moisture of crops	40.2	44.2	30.8	40.8	29.3	35.3	37.9	33.7
Costs of production and revenue	62.1	69.2	61.5	64.5	59.5	70.6	82.8	69.5
Irrigation scheduling/amounts	4.8	1.9	7.7	4.0	4.9	5.9	3.4	4.8
Percent keeping records (or charts) of commodity price								
Local cash prices	26.5	35.6	30.8	30.2	37.1	31.3	36.0	34.8
Futures market prices	16.2	17.8	15.4	16.7	14.3	12.5	24.0	16.3
Forward contract bids	7.4	20.0	7.7	11.9	14.3	6.3	16.0	12.0

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Importance of Farm Records in Decisionmaking

Using a five-point Likert scale, producers were asked to rank the importance of their farm information systems in supporting a variety of decisions. In crop production, pork producers did not differ to any great extent from field crop producers. Fertilization levels and crop variety selection were the most important uses. Buying crop insurance and irrigation scheduling were the least important. Pork producers ranked evaluation of government program or crop marketing decisions as less important than field crop producers. In fact, the mean scores for crop producers were uniformly higher than for pork producers.

The importance of the farm records systems in supporting livestock-related decisions did differ between farrowing and finishing units on a few key points. Farrowers

emphasized the importance in making ration, health or breeding herd decisions. Finishers rated marketing and market weight decisions somewhat higher.

Pork producers identified profit analysis and tax planning as the most important use of farm information for investment decisions. This was consistent with other farm types in the survey.

Larger hog farms tended to score information value higher than smaller farms (Table 7.5). For sow farrowing farms, the most important livestock decisions were associated with breeding and disease management. Financial and tax planning, in general, still received the highest scores.

Table 7.5. Importance of farm records system for making farm decisions - Hog farms by enterprise size. *

	Hog enterprise type							
	Farrowing				Finishing			
	Litters Farrowed			Total	Hogs Marketed			Total
Decision	100 - 199	200 - 499	More than 500		200 - 499	500 - 999	More than 1,000	
Crop decisions								
Fertilization amount	3.70	3.81	4.00	3.77	3.78	3.79	4.18	3.90
Pesticide amount and timing	3.39	3.28	4.29	3.44	3.42	3.16	3.77	3.43
Crop variety	3.65	3.74	4.07	3.72	3.86	4.03	3.89	3.93
Tillage system	2.97	2.68	3.43	2.92	2.81	3.15	3.42	3.09
What crops to plant by field	3.29	3.42	3.62	3.36	3.43	3.53	3.64	3.53
Evaluating crop insurance	2.19	2.27	2.23	2.22	1.93	2.23	2.52	2.20
How and when to market	2.92	3.02	3.15	2.98	3.23	3.19	3.36	3.25
Evaluating govt. programs	2.71	3.06	3.31	2.89	2.58	2.81	2.78	2.72
Determining land rental rates	2.65	3.12	3.00	2.85	2.54	3.00	3.04	2.83
Irrigation scheduling	1.43	1.57	2.00	1.58	2.38	1.40	1.55	1.72
Livestock decisions								
Most economical feed ration	3.35	3.69	4.00	3.53	3.09	3.55	3.74	3.43
Health program/disease prevention	3.74	3.78	4.31	3.82	3.23	3.48	3.54	3.40
What animals to cull	3.73	3.96	4.13	3.85	3.03	3.10	3.08	3.07
What sires to use	3.43	3.47	4.00	3.50	2.97	2.93	2.55	2.85
When to breed animals	3.82	3.86	4.38	3.89	3.06	2.83	2.86	2.93
Producing vs. purchasing feed/hay	2.63	2.53	2.69	2.60	2.52	2.96	2.33	2.62
Grazing intensity - stocking rate	1.99	1.45	2.36	1.83	1.93	2.00	1.68	1.89
When to expand/contract herd size	2.29	2.57	2.92	2.45	2.32	2.62	2.73	2.54
When to market animals/products	2.86	2.86	3.33	2.91	2.86	3.22	3.54	3.16
How/where to market animals/products	2.84	3.04	3.50	2.98	2.89	3.03	3.14	3.00
Investment decisions								
When to trade equipment	2.66	2.76	3.21	2.75	2.38	3.03	2.70	2.69
When to build/expand buildings	2.62	3.34	3.71	2.99	2.57	2.97	2.75	2.75
Evaluating lease/purchase of land	2.79	3.22	3.67	3.02	2.46	3.00	3.19	2.84
Evaluating lease/purchase of machinery	2.70	3.04	3.67	2.91	2.24	3.10	2.59	2.62
Borrowing money	3.27	3.96	4.38	3.62	3.11	3.47	3.63	3.37
Tax planning	3.98	4.15	4.36	4.07	3.90	4.30	3.93	4.04
Evaluating profitability of the farm	4.06	4.42	4.42	4.22	3.92	4.06	4.00	3.99
Home vs. business use of finances	3.14	3.10	4.00	3.21	2.61	3.30	2.85	2.92

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Importance score ranged from 1 (low) to 5 (high).

Computer Adoption

Farrowing operations were virtually tied with beef stocker/finishing with the highest reported rates of adoptions -- 33 percent. Hog finishers, however, had the lowest adoption

rates across farm types at 20 percent. Usefulness scores were essentially the same for all farm types. Pork producers reported approximately 13 hours of computer use per month for farm management tasks. Hog finishers seemed to require nearly twice the time before the computer became useful compared with their sow farrowing colleagues.

Presented in Table 7.6 are computer adoption rates as a function of enterprise size. For farrowing operations, computer use increased sharply with size -- from 29.5 percent for the smaller operators to 50 percent for enterprises with more than 500 sows. This trend was not as apparent with feeder pig finishers. The largest enterprises had a slightly lower adoption rate than mid-sized enterprises, but the difference was not significant from a statistical point of view. The difference may reflect the impact of larger scale contract feeding operations where recordkeeping is centralized.

Table 7.6. Percentage of farmers adopting computers and their evaluation of its usefulness for management - Hog farms by enterprise size.

	Hog enterprise type							
	Farrowing				Finishing			
	Litters Farrowed			Total	Hogs Marketed			Total
Measure	100 - 199	200 - 499	More than 500		200 - 499	500 - 999	More than 1,000	
Computer adoption percent.....	29.5	41.8	50.0	35.8	9.5	27.8	23.3	19.4
Computer usefulness score *.....	3.8	4.6	4.7	4.2	3.7	3.9	4.3	4.0
Hours of computer use per month @.....	10.8	15.7	13.9	13.4	7.7	12.9	13.0	12.1
Months before computer is useful #.....	6.5	6.4	6.2	6.4	6.0	8.8	17.5	11.2

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Hours of use of computer for farm management tasks.
\# Months from computer purchase until the computer was felt to be useful as a management tool.

For the most part, the reported uses of computers by hog farmers were consistent with the uses of farm information systems in general (Table 7.7). Accounting, business planning and tax management were the most common uses reported by pork producers. Finishers seemed more likely to use their computers for crop recordkeeping or market price applications. Less than 25 percent of pork producers used their computers to access electronic information services. Usefulness scores tended to follow frequency of use. The highest usefulness scores were associated with applications most frequently performed by the farmer.

Accounting software and electronic spreadsheets were the most frequently used applications for pork producers (Table 7.8). Farrowers tended to allocate relatively more time to accounting software than finishers. Finishers, on the other hand, reported a slight preference for spreadsheets. Hog farrowing farmers were more likely to use livestock record-keeping packages than were finishers.

Table 7.7. Management tasks for which the computer is used and helpfulness evaluations -- Hog farms by enterprise size.

Task	Hog enterprise type: Farrowing: Litters Farrowed: 100 - 199	200 - 499	More than 500	Total	Finishing: Hogs Marketed: 200 - 499	500 - 999	More than 1,000	Total
	Percent using							
Business financial accounting	89.5	84.2	62.5	82.6	100.0	90.0	71.4	85.0
Business planning	73.7	89.5	50.0	76.1	66.7	80.0	85.7	80.0
Tax computation	78.9	63.2	37.5	65.2	33.3	70.0	85.7	70.0
Business correspondence	36.8	52.6	50.0	45.7	33.3	40.0	57.1	45.0
Herd production recordkeeping	33.3	47.4	75.0	46.7	.0	50.0	42.9	40.0
Crop production recordkeeping	47.4	47.4	50.0	47.8	33.3	77.8	71.4	68.4
Marketing and price analysis	26.3	15.8	12.5	19.6	.0	44.4	57.1	42.1
Access to an electronic information service	31.6	5.3	25.0	19.6	.0	11.1	42.9	21.1
	Helpfulness score *							
Business financial accounting	4.6	4.6	4.8	4.6	4.0	4.3	4.8	4.4
Business planning	4.2	4.6	4.8	4.5	3.0	4.1	4.3	4.1
Tax computation	4.3	4.4	5.0	4.4	3.0	4.3	4.8	4.4
Business correspondence	3.8	3.6	3.8	3.7	.	4.3	3.8	4.0
Herd production recordkeeping	4.4	4.0	4.8	4.3	.	3.8	4.7	4.1
Crop production recordkeeping	3.3	3.8	4.5	3.6	4.0	3.9	4.0	3.9
Marketing and price analysis	3.8	4.7	.	4.1	.	2.8	4.0	3.4
Access to an electronic information service	3.7	4.0	5.0	3.9	.	4.0	5.0	4.7

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

The specific tasks performed by computers are also influenced rather dramatically by enterprise size. For smaller operations, accounting and related tax management activities were the most frequently identified uses. As the size of the farrowing enterprise increased, uses shifted toward herd production and access to electronic information services. Feeder pig finishers tended to emphasize accounting and tax applications -- even at the larger sizes. Use of market and other electronic services increased with size, however. The time allocation for the computer reported in Table 7.8 was consistent with these general trends. Pork producers use of computerized information networks also tends to increase with size (Table 7.9)

Table 7.8. Percentage of time that the farm computer is used for various computer software applications - Hog farms by enterprise size.

Software application	Hog enterprise type: Farrowing: Litters Farrowed: 100 - 199	200 - 499	More than 500	Total	Finishing: Hogs Marketed: 200 - 499	500 - 999	More than 1,000	Total
Business accounting software package	45.6	60.8	40.8	51.5	58.3	26.1	59.2	43.5
Tax computation package	2.8	2.6	.0	2.3	.0	20.5	.0	9.6
Electronic spreadsheet software	16.3	12.5	5.8	13.0	30.0	34.1	8.3	24.3
Word processing software	13.3	6.6	3.3	8.8	6.7	6.1	7.5	6.7
Data base management software	4.4	.6	.0	2.1	.0	6.7	.8	3.4
Market price analysis software package	4.1	.6	8.3	3.2	.0	.8	.0	.4
Crop recordkeeping software	5.7	2.4	6.7	4.4	5.0	1.3	.8	1.8
Livestock recordkeeping software	6.3	13.9	35.0	14.0	.0	4.1	2.5	2.8
Other	1.6	.0	.0	.7	.0	.5	20.8	7.6

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.

Use of Computerized Information Systems

Farrowing operations reported the highest rate of adoption or use of CIS, nearly 25 percent. Hog finishers were second with over 17 percent reporting CIS use. Again usefulness scores followed utilization rates. This result was somewhat surprising, particularly in view of availability of crop-related information services.

Table 7.9. Farmers' use of computerized information networks - Hog farms by enterprise size.

	Hog enterprise type							
	Farrowing				Finishing			
	Litters Farrowed			Total	Hogs Marketed			Total
Measure	100 - 199	200 - 499	More than 500		200 - 499	500 - 999	More than 1,000	
CIS adoption percent.....	18.39	32.08	26.67	23.87	14.63	11.11	30.00	17.76
CIS usefulness score *.....	4.26	4.21	4.60	4.28	4.29	4.00	4.78	4.47
Annual expenditure @.....	257.82	191.26	135.00	212.00	237.43	166.50	352.89	275.20

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).
@ Total expenditure for all CIS sources.

Professional Services

Consultants can serve both as a complement to and a substitute for a farm information system. Hog farrowers and finishers differed little in their use of various consultants. Tax preparers and veterinary consultants were the most frequently identified sources. County extension agents and accountants or financial advisors ran a distant third and fourth. Generally, the highest usefulness scores were associated with individuals providing focused, highly specialized information -- tax or veterinary specialists for example. Pork producers did not differ greatly from other farmers in this regard.

The use of outside consultants changes with enterprise size (Table 7.10). In addition, farrowing enterprises show some distinct differences when compared to hog finishers. Larger farrowing operations were more likely to use county extension agents, veterinary consultants and computer software vendors than were managers of smaller-sized enterprises. The large farrowing operations were less likely to use accountants or tax preparers. Larger feeder pig finishers were also much more likely to use accountants, county agents or veterinary consultants.

The importance scores for outside consultants generally increase with enterprise size. However, the highest scores tended to be assigned to the most focused or specialized consultants, a trend which held both for hog farrowing and finishing farms.

Table 7.10. Professional services used as a source of information during the past two years with importance ranking -- Hog farms by enterprise size.

Source	Hog enterprise type							
	Farrowing				Finishing			
	Litters Farrowed			Total	Hogs Marketed			Total
	100 - 199	200 - 499	More than 500		200 - 499	500 - 999	More than 1,000	
	Percent using							
Accountant or financial advisor	43.0	59.3	46.7	49.0	33.3	33.3	70.0	43.5
Farm records association agent	12.9	24.1	20.0	17.5	12.2	8.3	13.8	11.3
Tax preparer	87.1	85.2	78.6	85.6	85.7	83.3	79.3	83.2
Livestock management advisor	14.1	18.5	20.0	16.2	9.5	8.3	10.3	9.3
Crop/pest management consultant	31.4	38.9	33.3	34.2	31.7	27.8	31.0	30.2
Computer software vendor/advisor	5.8	14.8	20.0	10.3	4.8	13.9	6.9	8.4
Computer hardware vendor/advisor	3.5	5.6	6.7	4.5	4.8	5.6	.0	3.7
Farm management consultant	4.7	18.5	6.7	9.7	11.9	16.7	13.8	14.0
Coop. Extension - county agent	46.5	50.0	60.0	49.0	38.1	58.3	58.6	50.5
Coop. Extension - specialist	20.9	29.6	26.7	24.5	26.2	22.2	20.7	23.4
University professor	11.6	16.7	6.7	12.9	7.1	8.3	10.3	8.4
Vocational agriculture teacher	9.3	3.7	6.7	7.1	9.5	11.1	10.3	10.3
Veterinary consultant	73.3	75.9	93.3	76.1	66.7	77.8	75.9	72.9
	Importance score *							
Accountant or financial advisor	4.21	4.45	4.14	4.31	4.00	4.08	4.18	4.09
Farm records association agent	3.70	4.17	4.00	3.96	3.40	4.33	2.67	3.45
Tax preparer	4.36	4.45	4.45	4.40	4.26	4.41	4.40	4.35
Livestock management advisor	3.82	4.20	5.00	4.13	3.00	3.33	3.33	3.20
Crop/pest management consultant	4.00	4.20	4.20	4.10	3.77	3.20	4.29	3.70
Computer software vendor/advisor	4.00	3.50	3.33	3.63	1.50	3.20	4.50	3.11
Computer hardware vendor/advisor	4.00	3.33	2.00	3.43	5.00	4.00		4.33
Farm management consultant	3.50	3.89	4.00	3.79	3.00	3.83	3.00	3.36
Coop. Extension - county agent	3.68	3.85	4.11	3.79	3.13	3.62	3.33	3.38
Coop. Extension - specialist	3.82	3.47	4.00	3.69	3.45	3.63	3.33	3.48
University professor	3.80	3.13	5.00	3.58	2.33	3.33	3.00	2.89
Vocational agriculture teacher	3.71	4.00	4.00	3.78	3.00	3.75	5.00	3.70
Veterinary consultant	4.21	4.30	4.46	4.27	3.86	3.81	4.30	3.96

NC-191 survey for the 1990 production year. Sample statistics are unweighted and, thus, are representative only of the sample.
* Usefulness score ranged from 1 (low) to 5 (high).

Conclusions

In general, hog farrowing enterprises are much more management and information intensive than are hog finishing enterprises. In addition, information needs generally increase with increasing enterprise size. Consequently one would expect that the use of and value attributed to farm information systems should be higher for farrowing operations and increase with size. For the most part, the survey data supports these expectations. It is interesting, however, that larger enterprises generally increase their use of all information sources or providers. This suggests information sources or systems serve as complements rather than substitutes.

With the expansion of large scale contract finishing, and to a lesser extent, farrowing, it may be likely that the farmer producing under contract would receive relevant management information directly from the contracting firm. In this situation, farm operators may reduce the management information they use or seek out. The management recommendations of the contracting firm may substitute or replace the operator's active use of information currently being observed.

It would also seem likely, as integration or coordination in the pork industry increases, that future information systems may link other segments of the industry directly with the producer. Direct reporting of information now provided on kill sheets or slaughter checks from processing plants is likely to be shared. In addition information on weather conditions or other factors that influence environmentally sensitive operations could also be incorporated into future information systems used by pork producers.

Chapter 8

Summary and Implications

Marvin T. Batte

It is evident from the results of this survey that farmers vary widely in the maintenance and use of farm records. Furthermore, a comparison of these results to previous studies suggests that the use of farm records for decision support has increased in recent years.

Financial accounting records are an important part of the total farm information system. These records are used both for external reporting (e.g., to lenders and the Internal Revenue Service) and for internal decisionmaking. Most commercial farmers (95%) have some form of financial records. For most farms (88%), the record is kept by farm business personnel. Thirty-seven percent use a financial accounting service outside the business, with nearly a third maintaining both an internal record and using an external service. Other important observations about farm financial recordkeeping include:

- The use of an external records service was strongly related to various farm business and operator characteristics.[5] Farmers with post high school education were more likely to use an external financial records service (41% compared to 34% for those with less formal education). Farmers with larger-than-mean sales were significantly more likely to use an external service (52% versus 34% for smaller-sales farms). And, farmers who have a computer-assisted financial records system within the business also were more likely to use an external service (49% versus 34% for those with manual internal records). The difference in means for use of external records by operator age was not statistically different than zero.

- There were no statistically significant differences in the percentages of farmers keeping internal financial records for groups based on education level or farm sales class. There was a statistically significant (but not sizable) difference in the

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[5] A t-test of differences of means for groups of producers was used. Groups identified were farm operators with high school or less education versus farmers with post high school education levels; farm operators above and below the mean age of 49 years; farm operators above and below the approximate mean sales level of $200,000; and operators with computer-assisted financial record systems versus manual systems.

percentage of farmers with internal financial records based on age -- 89% of farmers below the mean age of 49 kept financial records compared to about 87% for farmers above the mean age.

- The media used to maintain the internal farm financial records differed substantially with business and operator characteristics. Farmers with post high school education levels were more than twice as likely to use a computer-assisted financial records system (37% versus 16% for farmers with high school or less education levels). The younger farmer group were nearly twice as likely to use a computer-assisted financial records system as were farmers above the mean age (34% versus 18%). Farmers with gross sales above the $200,000 sales level were more than twice as likely to use a computer-assisted system (43% as compared to 21% for the smaller sales farmers).

- Most of the farmers in the sample (70%) used a single-entry accounting system. However, the percentage employing double-entry methods varied significantly with business and operator characteristics. Farmers with higher formal education levels were nearly twice as likely to use double-entry accounting (31% versus 17%). Younger farmers more frequently used double-entry accounting methods as compared to older-than-mean-age farmers (28% versus 19%). Farmers with above average sales made greater use of double-entry methods (34% as compared to 20%). About half of the farmers with computer-assisted financial records reported use of double-entry methods as compared to only 14% for those with manual financial records systems.

- Most of the farmers using computer-assisted financial record-keeping systems used a software package designed for farm firms (54%) or a package designed for businesses not specific to agriculture (26%). Fourteen percent used general purpose software (electronic spreadsheets or database management software) for record-keeping chores. There were no significant differences in these percentages for farmers based on age or education level. Larger-sales farmers were more likely to use a specific purpose accounting software package than were smaller farmers (90% versus 79% for smaller farms).

- The operator or a partner in the farming business was primarily responsible for keeping financial records for most (64%) farm businesses. This differed importantly with operator and business characteristics. Farmers with greater formal education were more likely to bear record-keeping duties (73% versus 57% for lesser-educated farmers). Younger than average farmers more often performed record-keeping chores than did their older counterparts (68% versus 61%). For farms with computer-assisted financial records systems, the operator was less likely to maintain financial records (62% versus 65% for farms with manual records systems). And, farms with larger-than-average sales were less likely to assign record-keeping chores to an operator (62% as compared to 66% for smaller farms).

- The average farmer reported only 7.8 hours per month were spent keeping and analyzing farm financial records. Three-quarters of the farmers in the 13 states spent less than 10 hours per month keeping and analyzing their financial records. Again, this varied importantly with business and operator characteristics. Farmers in the higher education group spent an average of more than two hours per month more time for financial recordkeeping than did their less educated counterparts. Operators of larger farms (gross sales) spent nearly 4 hours more per month with their financial records than did farmers with smaller operations. Farmers with computer-assisted records spent twice the time of manual records system farmers (12.5 versus 6 hours per month).

There also was substantial variation in the way farmers used their financial records to support decisionmaking within the business. In particular, questions were asked regarding how these records were used to judge profitability of farm enterprises and to monitor firm cash flow. Results suggested:

- The average commercial farmer said that financial records were an important tool for analysis of farm decisions. Sixty-one percent said they used their financial records to judge the profitability of farm enterprises. This also varied by business characteristics. Seventy-two and 51 percent of the respondents in the post high school and high school or less groups, respectively, indicated use of financial records for profitability analyses. Younger-than-average farmers used the records more frequently for profitability analyses (69% versus 52%). More of the operators of large farms used their records for this task (73% versus 59% for smaller farms). And, those with computer-assisted financial records systems were more likely to do profitability analyses (78% versus 55% for manual recordkeepers).

- The monitoring of cash flows was the most important task supported by financial records. More than 71% of all farmers used their records for this purpose. Use of records for monitoring cash flow was greater for the more highly educated farmers (80% versus 63% for less educated farmers), greater for younger than older farmers (78% versus 63%), greater for larger businesses (80% for greater-than-average sales businesses versus 70% for smaller farms), and greater for operators with computer-assisted records systems (88% versus 67% for manual recordkeepers).

Production Records Systems

Unlike many industries where production processes are relatively simple and production is done in a controlled environment, crop and livestock farmers face complex biological production functions with many interactions with environmental variables. As a result, production records can be very important tools to analyze current production and to support future decisionmaking. Farmers were asked to describe their methods for keeping

crop and livestock production records and the content of those records. Important observations include:

- Most farmers (68%) use a pocket notebook to record primary data regarding crop production activities. Many farmers keep more detailed permanent records beyond this. Forty-five percent keep a field record book, and 14% use a computerized crop records system.

- The use of computerized crop records software is strongly related to measures of human capital and business size. Farmers with post high school education levels were more than twice as likely to use a computerized crop records system. Younger farmers were significantly more likely to use a computer for crop recordkeeping (18% versus 10% for older farmers). Farmers with greater-than-mean sales were nearly twice as likely to have a computer-based crop records system as were smaller farms (20% versus 12%).

- Most livestock farmers keep some form of production records. Eighty-four percent indicated they use a manual records system of some type. Ten percent use a computer-based records system.

- Production record-keeping methods varied substantially among livestock types. Dairy producers relied importantly on a service bureau (50% used DHIA or another service).

Records Usefulness to Support Farm Decisionmaking

Farmers keep records for a variety of reasons. Not all farmers use farm records for business decisionmaking, and there is substantial variation in how useful farmers view these records to be for decisionmaking.

- Of twenty-eight decisions identified, those that were judged as best supported by farm records data were evaluation of farm profitability, tax planning, livestock culling decisions, fertilization levels, and crop variety selection.

- Farmers' evaluations of information system usefulness for decision support is related to human capital and business size variables. For instance, the average information system usefulness score for support of eight investment decisions was significantly higher for more highly educated farmers, larger farms, and for farmers who utilize computer-based financial records.

Use of Computers and Electronic Information Systems

The adoption rate for computers by commercial farmers in the 13 states stood at

26.7 percent in March, 1991. Important observations about the adoption and use of computers include:

- Computer adoption rates vary across states. North Carolina and Oregon represented the extremes in adoption rates at 14% and 40%, respectively.

- Adoption rates vary substantially by farm type. Specialized hog finishing farms had the lowest adoption rate (20%); Beef stocker/finisher farms and hog farrowers had the highest adoption rates (33%).

- Computer adoption rates are positively related to education levels and business size and inversely related to operator age.

- Computer usefulness evaluations are uniformly high. There is little variation across farm or operator characteristics.

- The primary farm operator or a partner also was the operator of the computer on nearly 60 percent of the farms with computers. The usefulness of the computer was significantly greater for farms where the business operator was the computer operator (computer usefulness score is 4.16 for manager-operators versus 3.77 when operated by spouse, family member or farm employee).

- The bulk (55%) of those operating farm computers said that they had received no formal training. Of those who had received some formal training, the most common sources of computer training were college classes (16%), Vocational Agriculture or technical school classes (9%), and classes offered by a computer sales firm (9%).

- Business financial accounting was the task for which the farm computer was most frequently used. It also received the highest helpfulness score. About half of total computer time was spent with business accounting software packages.

Electronic information networks are a relatively new source of information to farm managers. Use of these networks has increased in recent years. Important conclusions regarding these electronic information tools include:

- Adoption of electronic information networks by commercial farmers is still quite low, averaging 12% for the 13 states. Adoption percentages vary greatly across states, ranging from a high of 28% in Indiana to a low of 1% in North Carolina and Oregon.

- Adoption of Electronic Information Services is negatively associated with age (17% for younger operators versus 8% for older farmers); positively associated with education (8% for high-school or less education versus 17% for operators with post

high school education); and positively associated with farm sales class (10% for smaller farms versus 21% for larger farms).

Use of Agricultural Professionals

An important dimension of the total farm information system is access to external consultants, both private and public. Farmers were asked to indicate which of 13 external information sources were used during the past two years.

- The most frequently used information sources (and their use percentages) were tax preparers (82%), Cooperative Extension Service county agents (51%), veterinary consultants (49%), and accountant or financial advisors (46%).

- The information services given the highest usefulness ratings were tax preparers, veterinary consultants, accountant or financial advisor, farm records association agent and crop/pest management consultant.

- There were few statistically significant differences in usefulness evaluations for these external sources due to differences in operator age or education or business size or type.

Implications

There a several implications of these results.

- Although many farmers currently do not have detailed records, substantial growth in the sophistication and use of records may be forthcoming. Younger, more highly educated farmers and operators of larger businesses (those most likely to adopt and use information technologies) are expected to replace older farmers (less likely to adopt new information system technologies) through natural turnover in the industry.

- Computer adoption by farmers is beginning to accelerate. Again, natural turnover within the farming industry will likely accelerate this trend as older farmers are replaced with the younger, better educated farmers who are more likely adopt computers. Also, most computer-adopting farmers tend to use the computer for one or few applications. There may be potential to expand the use of the computer to support of more decisions or to expand software/databases so that they are relevant for a greater array of decisions.

- Cooperative Extension Service educators should continue to offer computer training and development of computer-based education and decision support tools. The evidence from this survey suggests that the vast majority of those farmers who have

adopted computers view computers as a useful tool of management. This is true of farmers of all ages, education levels and farm types and sizes.

- Usage and usefulness evaluations for the Cooperative Extension Service (CES) is of great interest to many. The services of the CES continue to be widely used, by farms of all types and sizes and operators of all ages and education levels. Although the usefulness scores for CES are lower than for other highly specialized, single topic sources (e.g., accountants and tax preparers), the high use rates across farms of all types suggest CES is still viewed as relevant and useful.

- There is some evidence that external farm information sources complement rather than substitute for the farm's production and financial records system. Fifty percent used three or fewer external information sources in the two years prior to the survey. Those farmers with more rigorous farm information systems also made more use of external consultants. Farmers with double-entry accounting systems on average used one more external information source than those with single-entry accounting records. They also gave higher average evaluation scores for use of information for decision purposes. Similarly, farmers with computer-based accounting records tended to use more (about one) additional source of external information than manual recordkeepers -- and, their usefulness scores for use of records in decisionmaking were significantly higher. This suggests that those who value information for decisionmaking tend to look for it from a wide variety of sources. An implication is that the demand for information from external consultants (both public and private) is likely to continue to grow.

Indeed, farming has entered the information age. Farmers are in transition as they adopt newer information sources and technologies. Those involved in research and outreach education will need to continue to evolve with farmers, to assist them in making this change, and to insure that university personnel continue to be a relevant and important part of the farm information system.

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Appendix

Survey Instrument

Are you currently farming? (Circle the correct response)

1. NO --> If your response is no, please return the survey without completing the remaining questions.

2. YES --> Go to question A-1

Office Use

SECTION A: Farm Financial Record Systems

A-1. Do you use or subscribe to a service to keep some (or all) of your farm business records? (include farm business associations, accountants, consultants or other paid services.)

1. NO . . . . . Go to question A-3
2. YES

A-2. Which of the following best describes this service? (Circle ONE)

1. ACCOUNTANT
2. ATTORNEY
3. RECORD KEEPING BUSINESS, BUREAU, OR ASSOCIATION
4. OTHER (PLEASE SPECIFY) _____

A-3. Aside from this service, do you keep a farm records workbook, general ledger or use some other method to record the farm's financial activities?

1. NO . . . . . Go to question A-10
2. YES

A-4. Who is primarily responsible for keeping these records? (Circle ONE)

1. I AM
2. PARTNER IN THE FARMING BUSINESS
3. SPOUSE OR OTHER FAMILY MEMBER
4. HIRED EMPLOYEE
5. OTHER (PLEASE SPECIFY) _____

A-5. Which of the following best describes your financial record system? (Circle ONE)

1. MANUAL RECORD SYSTEM
2. COMPUTER-BASED RECORD SYSTEM
3. BOTH MANUAL AND COMPUTER BASED COMPONENTS
4. MAIL-IN RECORDS SYSTEM

A-6. Are your financial records based on single or double-entry accounting methods? (Circle ONE)

1. SINGLE-ENTRY ACCOUNTING
2. DOUBLE-ENTRY ACCOUNTING
3. DON'T KNOW

A-7. Did you set up your own account names and/or numbers, or did you use someone else's? (Circle ONE)

1. I DESIGNED THE ACCOUNT STRUCTURE
2. SOMEONE ELSE DESIGNED THE ACCOUNT STRUCTURE

A-8. If your financial records are computer based, which of the following best describes your system? (Circle ONE.)

1. GENERAL BUSINESS ACCOUNTING SOFTWARE (E.G., QUICKEN, DAC-EASY)
2. ACCOUNTING PACKAGE DESIGNED FOR FARM FIRMS (E.G.,REDWING, FBS)
3. ACCOUNTS ARE MAINTAINED ON AN ELECTRONIC SPREADSHEET (E.G., LOTUS 1-2-3)
4. ACCOUNTS ARE MAINTAINED USING DATABASE MANAGEMENT SOFTWARE (E.G., dBASE)
5. MAIL-IN RECORDS SYSTEM
6. OTHER (PLEASE SPECIFY) _____

A-9. How frequently are receipt and expense data entered into your farm records

_____ times per month

A-10. Typically, how many hours per month are spent keeping and analyzing farm financial records?

_____ hours per month.

A-11. Please indicate whether you use financial records for each of the following tasks and rank the importance of your records for each task.

		Use Records? (Circle One)		Importance Low High (Circle One)	Office Use
1.	PROVIDING FINANCIAL RECORDS TO LENDERS	NO	YES	1 2 3 4 5	/
2.	PROVIDING FINANCIAL RECORDS TO LANDLORDS	NO	YES	1 2 3 4 5	/
3.	PROVIDING FINANCIAL INFORMATION TO OTHER INVESTORS IN THE BUSINESS	NO	YES	1 2 3 4 5	/
4.	PROVIDING REPORTS TO GOV'T REGULATORY AGENCIES (FICA, ASCS, WORKERS' COMP.)	NO	YES	1 2 3 4 5	/
5.	IDENTIFYING UNPROFITABLE PARTS OF THE BUSINESS (BUDGETING, INCOME STATEMENT)	NO	YES	1 2 3 4 5	/
6.	MONITORING CASH FLOWS	NO	YES	1 2 3 4 5	/
7.	MARKETING PLANNING AND ANALYSIS	NO	YES	1 2 3 4 5	/
8.	EVALUATING GOV'T PROGRAM OPTIONS	NO	YES	1 2 3 4 5	/

SECTION B: Crop Record System

B-1. What was the total acreage in the farms you operated in 1990? _____

B-2. How many acres do you:

OWN _____ CASH LEASE _____ SHARE LEASE _____

B-3. How many acres are in the following categories?

TILLABLE _____ PASTURE OR RANGE _____ TIMBER _____ OTHER _____

B-4. Please indicate your approximate 1990 <u>acreage</u> in each of the following <u>crop</u> categories.

	Acres
GRAINS & OILSEEDS (E.G., CORN, SOYBEANS, WHEAT, RICE)	_____
FORAGES (E.G., HAY, SILAGE)	_____
FIBER CROPS (E.G., COTTON)	_____
FRUITS, NUTS, AND BERRIES (INCLUDING ORCHARD CROPS)	_____
VEGETABLES (E.G., POTATOES, BEANS, SWEET CORN)	_____
SEED CROPS (E.G., GRASS SEED, BULBS, CLOVER SEED)	_____
NURSERY CROPS (E.G., CHRISTMAS TREES, ORNAMENTALS)	_____
OTHER SPECIALTY CROPS (E.G., HERBS, FLOWERS, TOBACCO)	_____

B-5. Circle all crop information that you record every year either on a field-level or enterprise (crop) basis?

		Field Records (Circle One)		Crop Records (Circle One)		Office Use
1.	FERTILIZER USED	NO	YES	NO	YES	/
2.	MANURE APPLIED	NO	YES	NO	YES	/
3.	HERBICIDES APPLIED	NO	YES	NO	YES	/
4.	INSECTICIDES OR FUNGICIDE APPLIED	NO	YES	NO	YES	/
5.	MACHINERY OPERATIONS PERFORMED	NO	YES	NO	YES	/
6.	YIELD	NO	YES	NO	YES	/
7.	MOISTURE OF CROPS	NO	YES	NO	YES	/
8.	COSTS OF PRODUCTION AND REVENUE	NO	YES	NO	YES	/
9.	IRRIGATION SCHEDULING/AMOUNTS	NO	YES	NO	YES	/

B-6. What methods do you use to record crop data? (Circle <u>All</u> that apply)

1. NOTES ON CALENDARS
2. POCKET NOTEBOOK
3. FIELD RECORD BOOK
4. COMPUTERIZED CROP RECORDS PROGRAM (E.G., Field Manager, CropAudit)
5. COMPUTER DATA BASE OF MY DESIGN

B-7. Do you regularly test the soils in tillable fields? . . NO YES

B-8. What is your main market crop (e.g., largest sales)? _____

How do you market this crop? (Circle <u>ALL</u> that apply)

1. CASH SALES AT HARVEST WITHOUT STORAGE
2. CASH SALES AFTER STORING THE CROP
3. FORWARD CASH CONTRACT
4. HEDGING USING FUTURES MARKET
5. HEDGING USING OPTIONS MARKET
6. CONTRACT WITH PROCESSOR
7. FEED TO LIVESTOCK
8. PROCESS AND SELL AS PROCESSED PRODUCT

B-9. Do you keep records (or charts) of commodity price? (Circle ALL that apply)
1. LOCAL CASH PRICES
2. FUTURES MARKET PRICES
3. FORWARD CONTRACT BIDS

Office Use

SECTION C: Livestock Record System

C-1 Do you have a livestock enterprise on your farm?

1. NO . . . . . Go to question D-1
2. YES . . . . . Answer the following questions

C-2 How many animals of the following types did you have during 1990?

Dairy Cattle -- Number of cows freshening last year. . . . . _____

Beef Cattle:
Cow-calf -- Number of cows calving last year. . . . . _____
Stocker -- Number of head sold last year. . . . . _____
Feedlot -- Number of head finished last year. . . . . _____

Hogs:
Farrowing -- Total number of farrowings last year. . . . . _____
Feeder pigs -- Number of feeder pigs sold last year. . . . . _____
Market hogs -- Number of finished hogs sold last year. . . . . _____

Sheep:
Breeding -- Total number of lambings last year. . . . . _____
Feeder lambs -- Number of feeder lambs sold last year. . . . _____
Finished lambs -- Number of finished lambs sold last year. . . _____

Other (Specify) _____ . . _____

Other (Specify) _____ . . _____

C-3. For breeding and dairy animals (e.g., beef cows, dairy cows, and sows), do you keep the following types of information? (Circle All that apply)?

1. I DO NOT HAVE BREEDING ANIMALS
2. ANIMAL HEALTH RECORDS
3. A SCHEDULE OF WHEN PREGNANT ANIMALS ARE DUE
4. SIRES OF PREGNANT ANIMALS
5. NUMBER OF OFFSPRING
6. WEIGHTS OF OFFSPRING
7. BIRTHDATES OF OFFSPRING
8. SIRE AND DAM OF OFFSPRING

C-4. For breeding and dairy animals (e.g., dairy and beef cows and sows), how do you record and keep information in question C-3? (Circle All that apply)

1. I DO NOT HAVE BREEDING ANIMALS
2. A MANUAL SYSTEM ON PAPER
3. A COMPUTER PROGRAM I DESIGNED
4. A COMPUTER PROGRAM I PURCHASED
5. A SERVICE BUREAU (E.G., DAIRY HERD IMPROVEMENT ASSOCIATION)

C-5. For dairy, how do you keep milk production records? (Circle All that apply)

1. I DO NOT HAVE DAIRY COWS
2. I DO NOT KEEP MILK PRODUCTION RECORDS
3. DHI PRODUCTION REPORTS
4. A SERVICE BUREAU OTHER THAN DHI
5. USING A SYSTEM I DESIGNED

C-6. Do you keep records of feed fed to animals? (Circle ONE)

1. NO
2. YES - ON A TOTAL FARM BASIS ONLY
3. YES - ON A SPECIES BASIS ONLY
4. YES - ON A GROUP LEVEL WITHIN SPECIES
5. YES - ON AN INDIVIDUAL ANIMAL BASIS

How are these records kept? (Circle ONE)

1. PAPER SYSTEM
2. SELF DESIGNED COMPUTER PROG
3. PURCHASED COMPUTER PROGRAM
4. OTHER

SECTION D: Use of Farm Records

D-1 How important are the farm records you maintain (including financial, crop, livestock, and other records) for each of the following decisions? (Circle one response in each row).

	Importance					Office Use
Crop Decisions (If you have crop enterprises.)	Low				High	
1. FERTILIZATION AMOUNT	1	2	3	4	5	
2. PESTICIDE AMOUNT AND TIMING	1	2	3	4	5	
3. CROP VARIETY	1	2	3	4	5	
4. TILLAGE SYSTEM	1	2	3	4	5	
5. WHAT CROPS TO PLANT BY FIELD	1	2	3	4	5	
6. EVALUATING CROP INSURANCE	1	2	3	4	5	
7. HOW AND WHEN TO MARKET	1	2	3	4	5	
8. EVALUATING GOVT. PROGRAMS	1	2	3	4	5	
9. DETERMINING LAND RENTAL RATES	1	2	3	4	5	
10. IRRIGATION SCHEDULING	1	2	3	4	5	
Livestock Decisions (If you have livestock.)						
1. MOST ECONOMICAL FEED RATION	1	2	3	4	5	
2. HEALTH PROGRAM/DISEASE PREVENTION	1	2	3	4	5	
3. WHAT ANIMALS TO CULL	1	2	3	4	5	
4. WHAT SIRES TO USE	1	2	3	4	5	
5. WHEN TO BREED ANIMALS	1	2	3	4	5	
6. PRODUCING VS. PURCHASING FEED/HAY	1	2	3	4	5	
7. GRAZING INTENSITY - STOCKING RATE	1	2	3	4	5	
8. WHEN TO EXPAND/CONTRACT HERD SIZE	1	2	3	4	5	
9. WHEN TO MARKET ANIMALS/PRODUCTS	1	2	3	4	5	
10. HOW/WHERE TO MARKET ANIMALS/PRODUCTS	1	2	3	4	5	
Investment Decisions						
1. WHEN TO TRADE EQUIPMENT	1	2	3	4	5	
2. WHEN TO BUILD/EXPAND BUILDINGS	1	2	3	4	5	
3. EVALUATING LEASE/PURCHASE OF LAND	1	2	3	4	5	
4. EVALUATING LEASE/PURCHASE OF MACHINERY	1	2	3	4	5	
5. BORROWING MONEY	1	2	3	4	5	
6. TAX PLANNING	1	2	3	4	5	
7. EVALUATING PROFITABILITY OF THE FARM	1	2	3	4	5	
8. HOME VS. BUSINESS USE OF FINANCES	1	2	3	4	5	

SECTION E: On-Farm Computer Use

E-1. Do you use a computer in any aspect of your farm business?

1. NO . . . . . Go to question F-1
2. YES . . . . . Answer the following questions.

E-2. Which best describes your primary computer system? (Circle ONE)

1. IBM (OR COMPATIBLE) MICROCOMPUTER (MS-DOS)
2. APPLE II (OR COMPATIBLE) MICROCOMPUTER
3. APPLE MACINTOSH MICROCOMPUTER
4. OTHER MICROCOMPUTER (BRAND _____)
5. MINI OR MAINFRAME COMPUTER (OWNED)
6. TIME-SHARING COMPUTER SYSTEM
7. MAIL-IN COMPUTER SERVICE

E-3. If your primary computer is a microcomputer, please answer the following.

1. Does your microcomputer have a hard (fixed) disk drive?	NO	YES	DON'T KNOW
2. Do you have a MODEM for your computer?	NO	YES	DON'T KNOW
3. Does your computer have a math co-processor?	NO	YES	DON'T KNOW
4. Do you have a printer?	NO	YES	DON'T KNOW
5. How much RAM does your computer have?	_____ K		DON'T KNOW

E-4. In what year did you purchase the computer? 19_____

E-5. Who is the primary operator of the computer for business uses? (Circle ONE)

1. I AM
2. PARTNER IN THE FARM BUSINESS
3. SPOUSE
4. OTHER FAMILY MEMBER
5. EMPLOYEE

E-6. About how many hours per month do you use your farm computer (farm use).

_____ hours per month

E-7. How did this person learn to use the computer? (Circle ONE) | Office Use

1. HIGH SCHOOL CLASSES
2. COLLEGE CLASSES
3. CLASSES OFFERED BY COMPUTER SALES FIRM
4. CLASSES OFFERED BY OTHER LOCAL BUSINESS
5. CLASSES OFFERED BY THE COOPERATIVE EXTENSION SERVICE
6. VO-AG OR TECHNICAL SCHOOL CLASSES SERVICE
7. OTHER (PLEASE SPECIFY) _____
8. SELF-TAUGHT: NO FORMAL TRAINING

E-8. For which tasks do you use the computer and how helpful is it?

	Is Computer used for this task?	Helpfulness in Management (Low ... High)	
1. BUSINESS FINANCIAL ACCOUNTING	NO YES	1 2 3 4 5	/
2. BUSINESS PLANNING (BUDGETS, PROJECTED CASH FLOW STATEMENTS, ETC.)	NO YES	1 2 3 4 5	/
3. TAX COMPUTATION	NO YES	1 2 3 4 5	/
4. BUSINESS CORRESPONDENCE	NO YES	1 2 3 4 5	/
5. HERD PRODUCTION RECORDKEEPING (E.G., HERD HEALTH & BREEDING RECORDS)	NO YES	1 2 3 4 5	/
7. CROP PRODUCTION RECORDKEEPING (E.G., YIELD & FERTILIZATION RECORDS)	NO YES	1 2 3 4 5	/
8. MARKETING AND PRICE ANALYSIS (E.G., CHARTING, FORECASTING, ETC.)	NO YES	1 2 3 4 5	/
9. ACCESS TO AN ELECTRONIC INFORMATION SERVICE	NO YES	1 2 3 4 5	/

E-9. Please indicate the percentage of time (business use only) that your computer is used for each of the following computer software applications. (If you do not use a software type, enter 0 (zero).)

Percent of Time Used

_____ 1. BUSINESS ACCOUNTING SOFTWARE PACKAGE (E.G., QUICKEN, REDWING, FBS)
_____ 2. TAX COMPUTATION PACKAGE (E.G., QUICKEN, TURBO TAX)
_____ 3. ELECTRONIC SPREADSHEET SOFTWARE (E.G., LOTUS, EXCEL, SUPERCALC)
_____ 4. WORD PROCESSING SOFTWARE (E.G., WORD PERFECT, WORDSTAR, PFS:WRITE)
_____ 5. DATA BASE MANAGEMENT SOFTWARE (E.G., dBASE, PARADOX, PC-FILE)
_____ 6. MARKET PRICE ANALYSIS SOFTWARE PACKAGE (E.G. MARKET WINDOW, PCMARKET)
_____ 7. CROP RECORDKEEPING SOFTWARE (E.G., FIELD MANAGER, CROPAUDIT)
_____ 8. LIVESTOCK RECORDKEEPING SOFTWARE (E.G., PIONEER, CHAPS)
_____ 9. OTHER (PLEASE SPECIFY) _____
100 %

E-10. To what extent do you feel the computer has either saved time or provided better information than "hand" records? (Circle ONE) . . . . . Improvement: Not at all 1 2 3 4 5 Very much | _____

E-11. How much time passed from when you purchased the computer system until you felt it became useful?

_____ months | _____

SECTION F: Use of Computerized Information Services

F-1. Do you subscribe to a computerized information service? (for example, Farm Bureau ACRES, Pioneer Information Services, COMPUSERVE, DTN, etc.)

1. NO . . . . . Go to question G-1
2. YES . . . . . Answer the following questions.

Please indicate the services to which you subscribe.	Annual Cost	Usefulness (low ... high)	
1._____	_____	1 2 3 4 5	_____
2._____	_____	1 2 3 4 5	_____
3._____	_____	1 2 3 4 5	_____
4._____	_____	1 2 3 4 5	_____

SECTION G: Use of Agricultural Professionals

G-1. During the past two years, which of the following professional services have you used as a source of information and how useful have these been?

	Was this source used? (Circle One)		Usefulness low High (Circle One)					Office Use
1. ACCOUNTANT OR FINANCIAL ADVISOR	NO	YES	1	2	3	4	5	/
2. FARM RECORD ASSOCIATION AGENT	NO	YES	1	2	3	4	5	/
3. TAX PREPARER	NO	YES	1	2	3	4	5	/
4. LIVESTOCK MANAGEMENT ADVISOR	NO	YES	1	2	3	4	5	/
5. CROP/PEST MANAGEMENT CONSULTANT	NO	YES	1	2	3	4	5	/
6. COMPUTER SOFTWARE VENDOR/ADVISOR	NO	YES	1	2	3	4	5	/
7. COMPUTER HARDWARE VENDOR/ADVISOR	NO	YES	1	2	3	4	5	/
8. FARM MANAGEMENT CONSULTANT	NO	YES	1	2	3	4	5	/
9. COOP. EXTENSION - COUNTY AGENT	NO	YES	1	2	3	4	5	/
10. COOP. EXTENSION - SPECIALIST	NO	YES	1	2	3	4	5	/
11. UNIVERSITY PROFESSOR	NO	YES	1	2	3	4	5	/
12. VOCATIONAL AGRICULTURE TEACHER	NO	YES	1	2	3	4	5	/
13. VETERINARY CONSULTANT	NO	YES	1	2	3	4	5	/

SECTION H: Next, we would like to ask some questions about you, and the farm. Again, your name will be removed prior to our seeing the survey.

H-1. If you sold at auction all farm assets, what would be the total receipts (market value). Include farm assets owned by all business partners:

Machinery $ _____ Livestock $ _____ Land/Buildings $ _____

H-2. What is the approximate total amount of farm debt outstanding? . . . . . $ _____

H-3. What was your gross farm income for 1989 (from tax form Schedule F, line 11. If Partnership or Corporation, report total for all owners)? . . . . . $ _____

H-4. What was your net farm profit or loss for 1989 (from tax form Schedule F, line 36. Report for all owners.)? . . $ _____

H-5. What was your family's adjusted gross income for 1990 (from tax form 1040, line 31)? . . . . . $ _____

LABEL

- - - - - - - - - - - - - - - - - - TEAR - - - - - - - - - - - - - - - - - -

H-6. In what county is the majority of your land located? _____ | Office Use

H-7. Which of the following best describes your farming business? (Circle ONE)

		Number of owners	What percent of the farm profit is your share?	
1.	SOLE PROPIETORSHIP			_____
2.	PARTNERSHIP	_____	_____ %	____/____
3.	CORPORATION	_____	_____ %	____/____
4.	OTHER (PLEASE DESCRIBE) _____			_____

H-8. What is your age? . . . . . _____ years

H-9. Are you? (Circle ONE) . . . . . MALE FEMALE _____

H-10. What is the highest level of education that you attained? (Circle ONE).

1. LESS THAN HIGH SCHOOL
2. SOME HIGH SCHOOL
3. HIGH SCHOOL GRADUATE
4. SOME COLLEGE LEVEL EDUCATION
5. COLLEGE GRADUATE
6. SOME POST-GRADUATE EDUCATION
7. GRADUATE OR PROFESSIONAL DEGREE

_____

H-11. To what extent are you, and if married, your spouse employed on and off the farm? Consider custom work to be on-farm work. Estimate weeks worked per year and average hours per week worked.

	On-farm employment		Off-farm employment	
	weeks/year	average hrs/wk	weeks/year	average hrs/wk
You				
Spouse				

Thank you for participating in the study. Please watch for a summary publication of results from your State University Agricultural Economics Department.

The Ohio State University
Ohio Agricultural Research and Development Center
Wooster, Ohio 44691

The Ohio State University
Ohio Agricultural Research and Development Center
1680 Madison Avenue
Wooster, Ohio 44691
216-263-3700
330-263-3700 after March 9, 1996